RANGES OF TAXA

The stratigraphic distribution of the Brachiopoda recognized in Part H, Revised, volumes 2–6 is shown graphically in the range chart (Table 41).

Because of the very long stratigraphic ranges of many higher taxa of Brachiopoda, ranges in the chart are rather broad in order to ensure that all periods are included. For more detailed stratigraphic information, refer to the systematic sections of volumes 2–6, p. 28–2330 and p. 2532–2821.

The following chart was compiled using software developed for the Paleontological Institute by Kenneth C. Hood and David W. Foster.

It must be emphasized that the order of taxa in this chart is governed entirely by their stratigraphic range and, within that, by alphabetical order, and differs in some cases from the taxonomic order in the systematic parts of the volumes. No taxonomic conclusions should be drawn from the position of taxa in this chart.

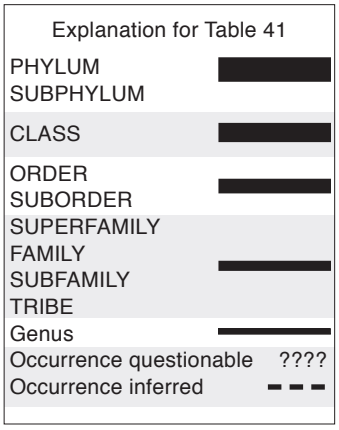


TABLE 41. Stratigraphic Distribution of the Brachiopoda.

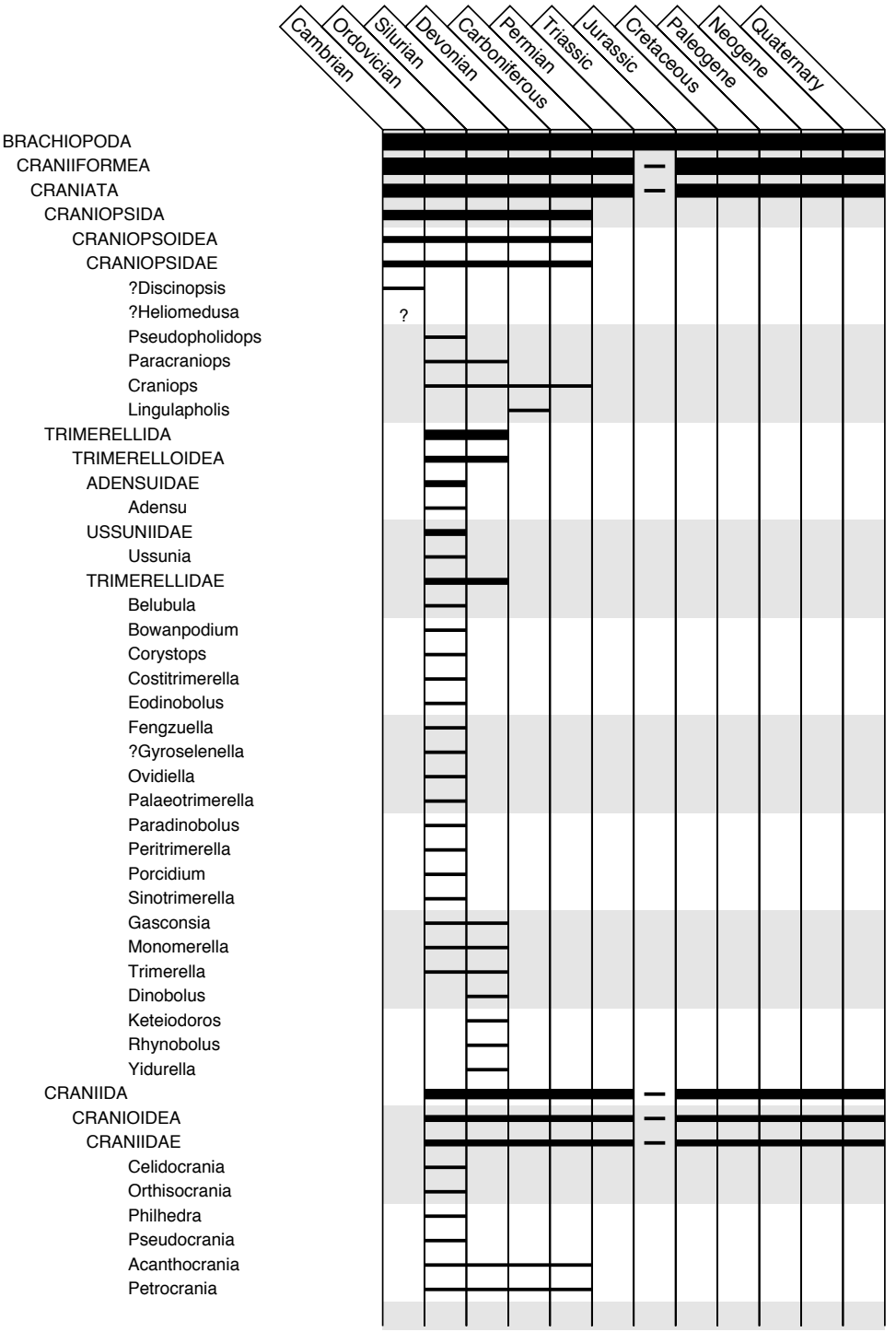


TABLE 41. *(Continued).*

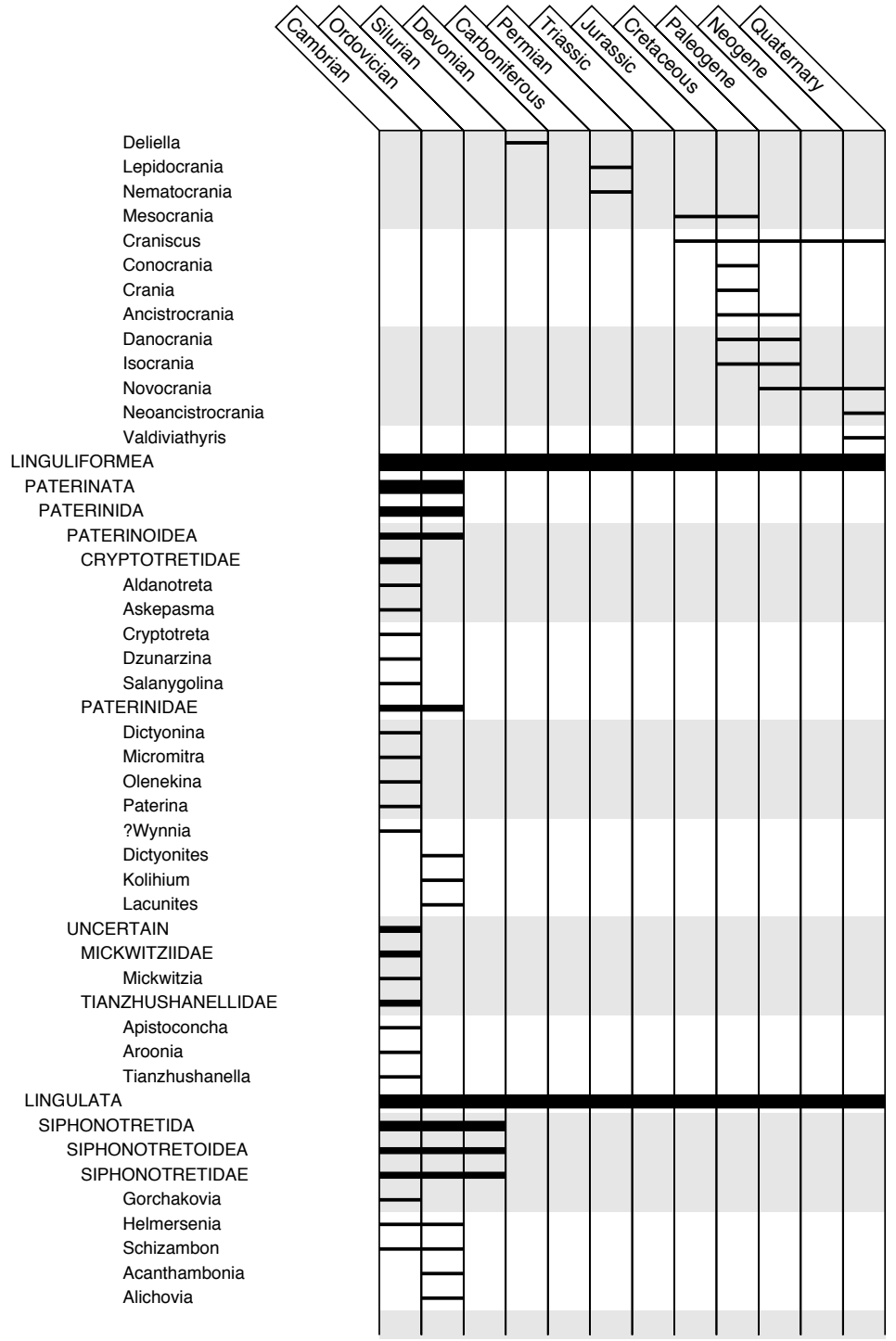


TABLE 41. *(Continued).*

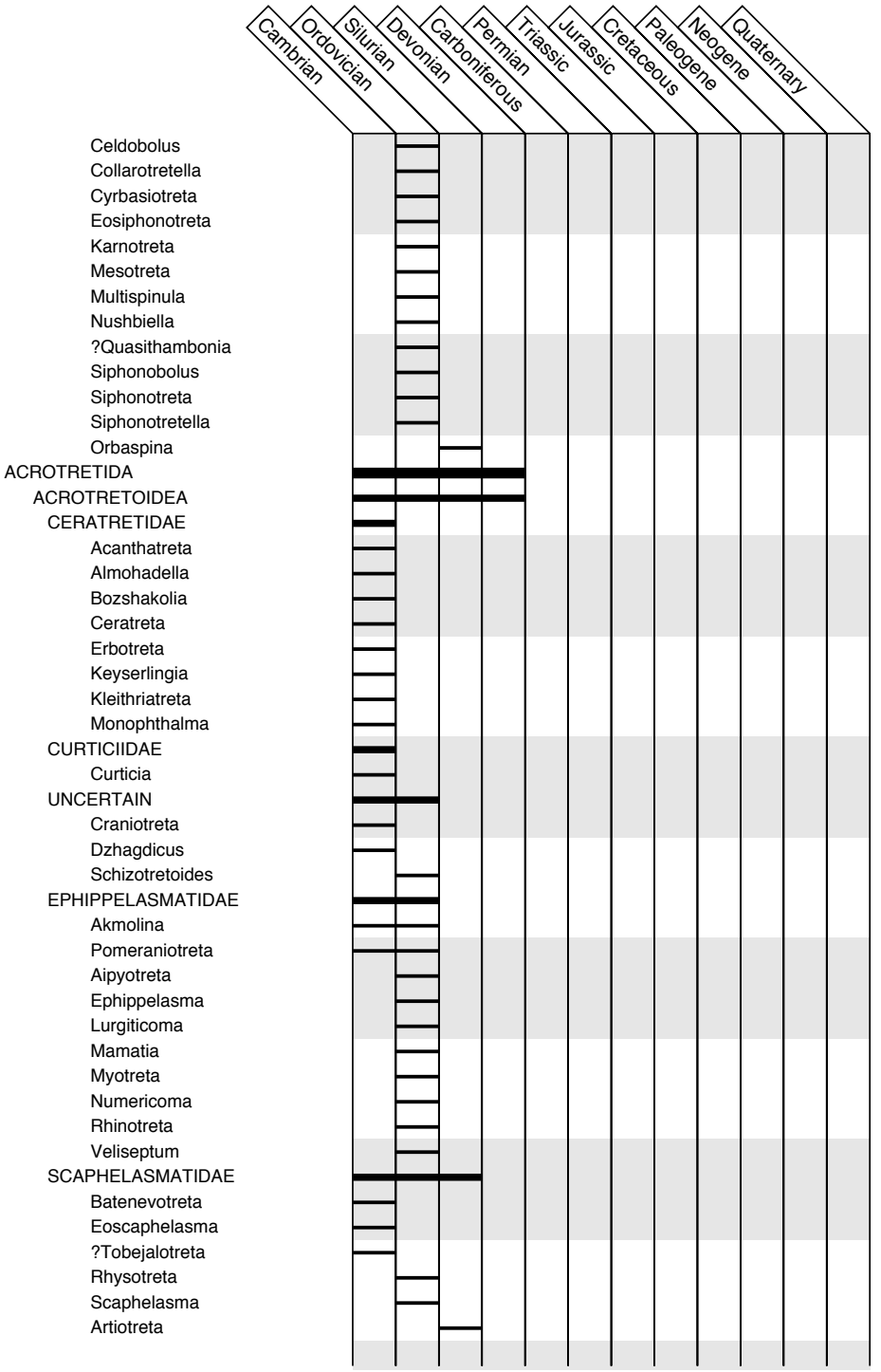


TABLE 41. *(Continued).*

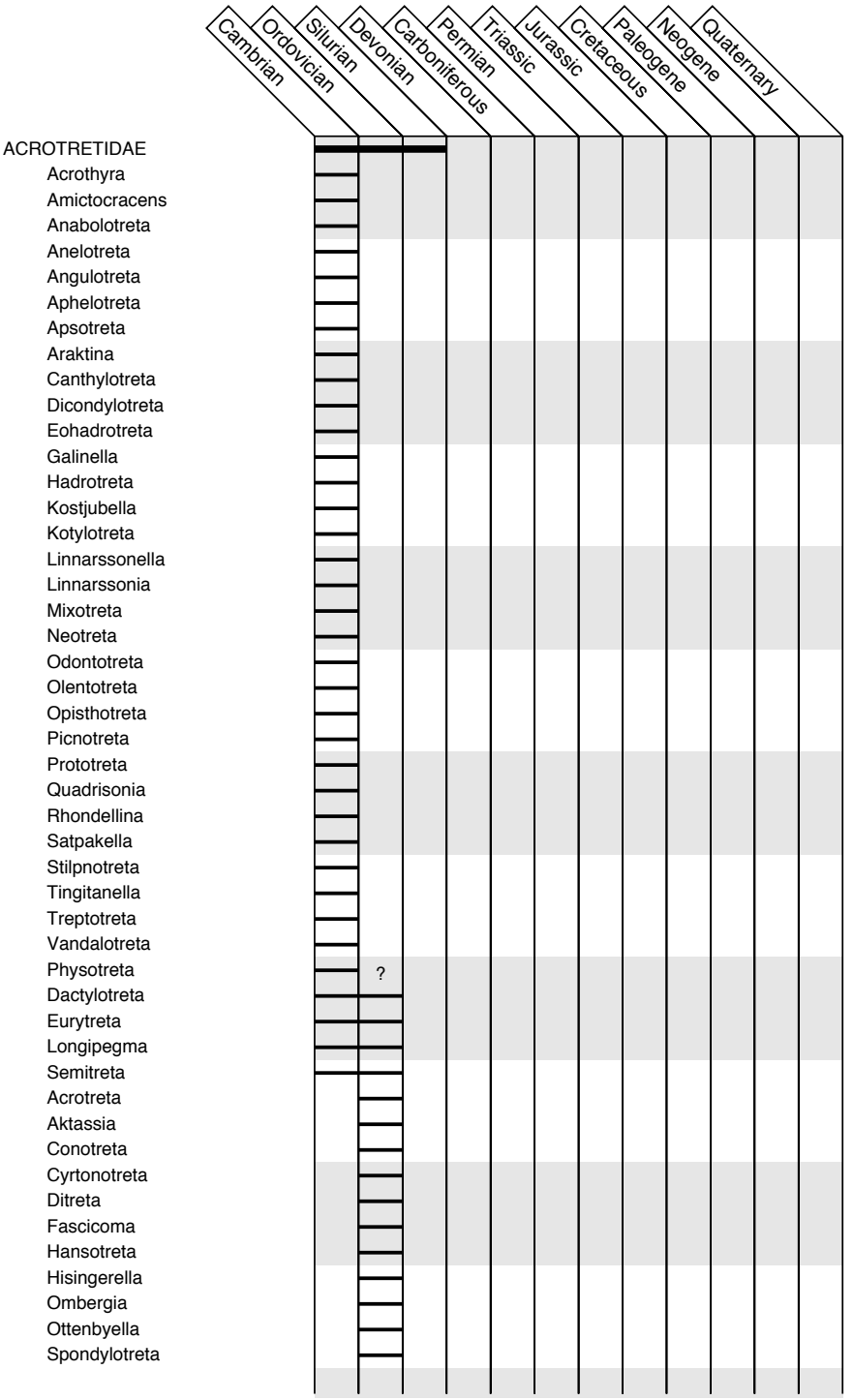


TABLE 41. *(Continued).*

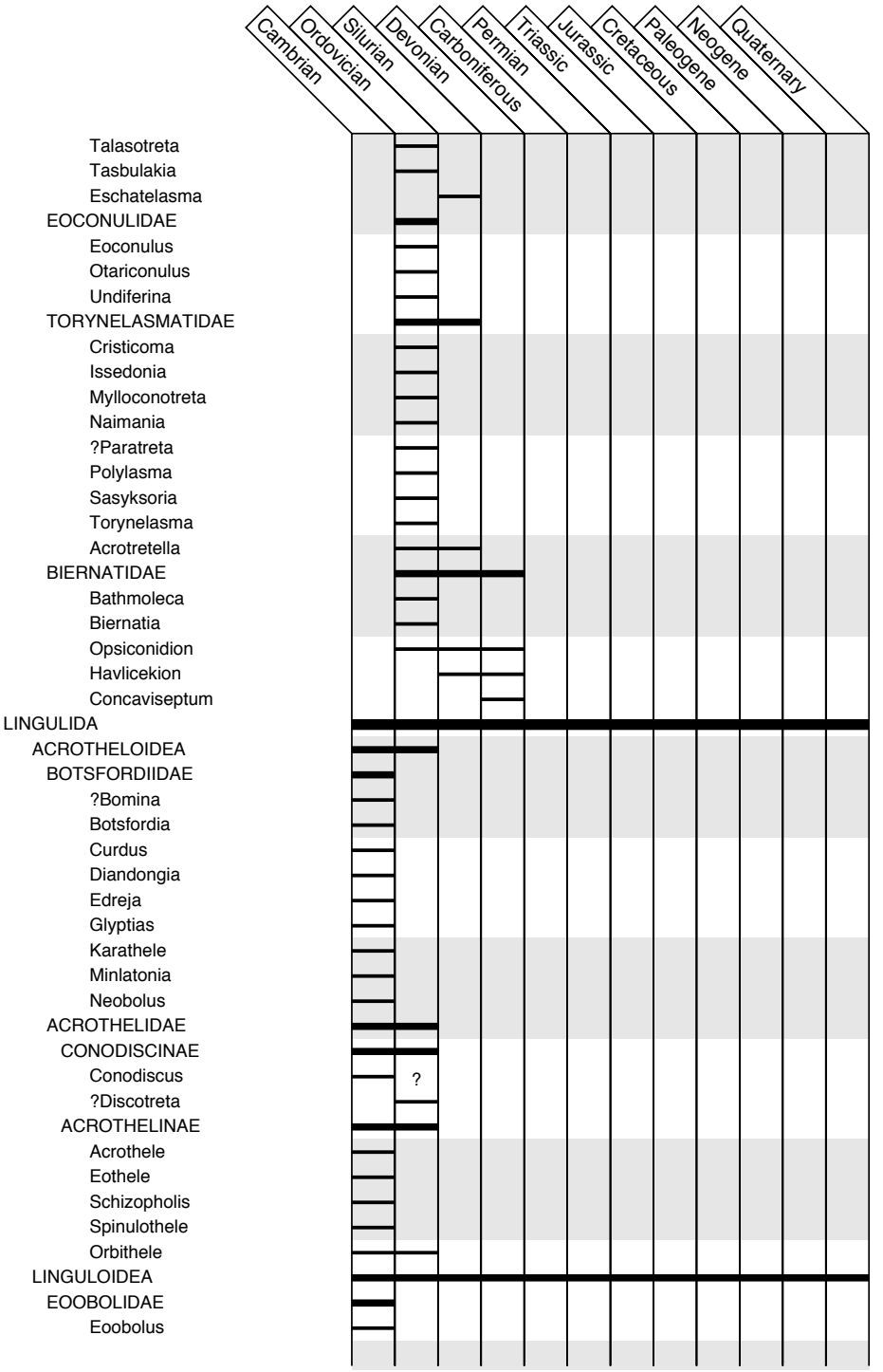


TABLE 41. *(Continued).*

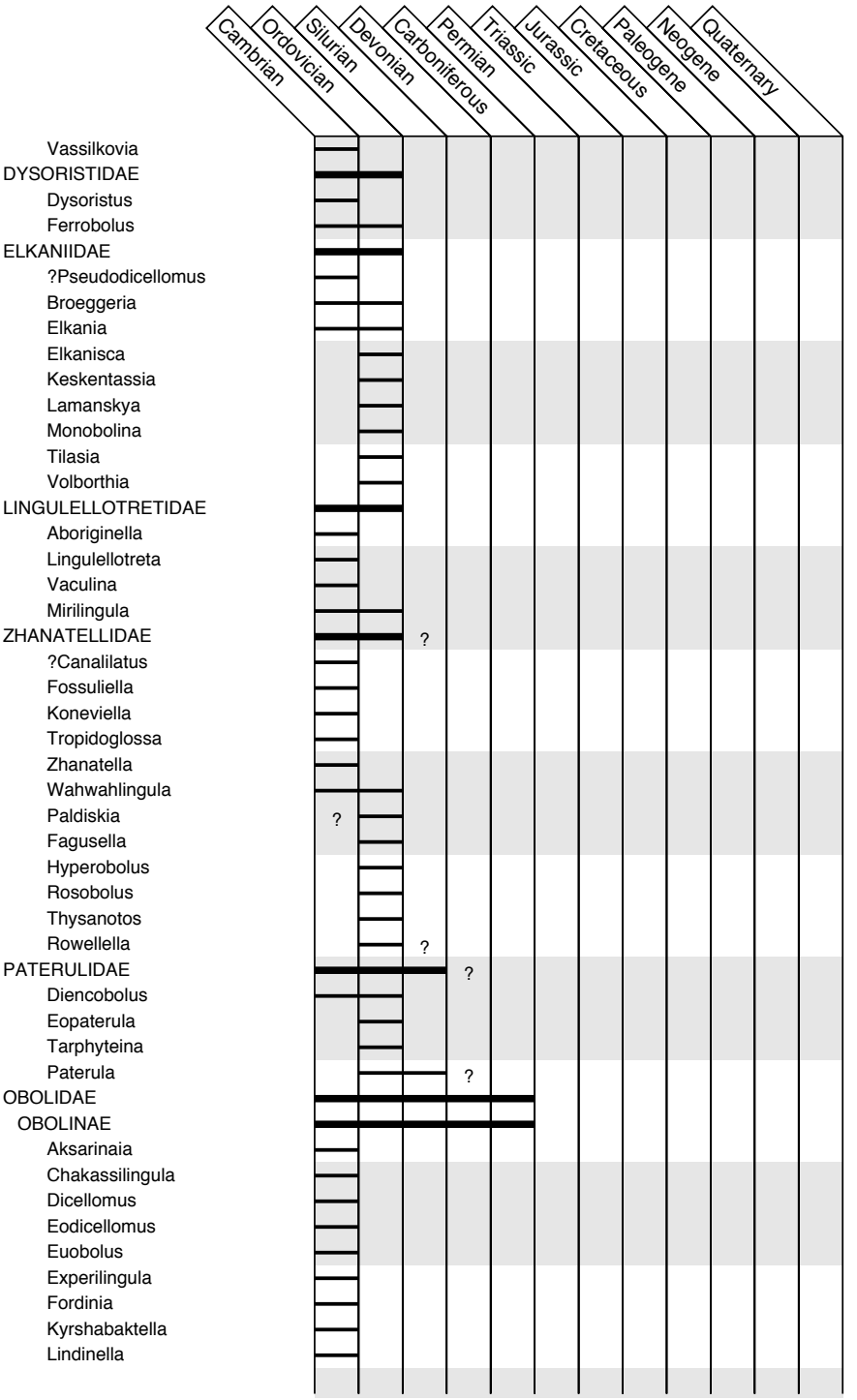


TABLE 41. *(Continued).*

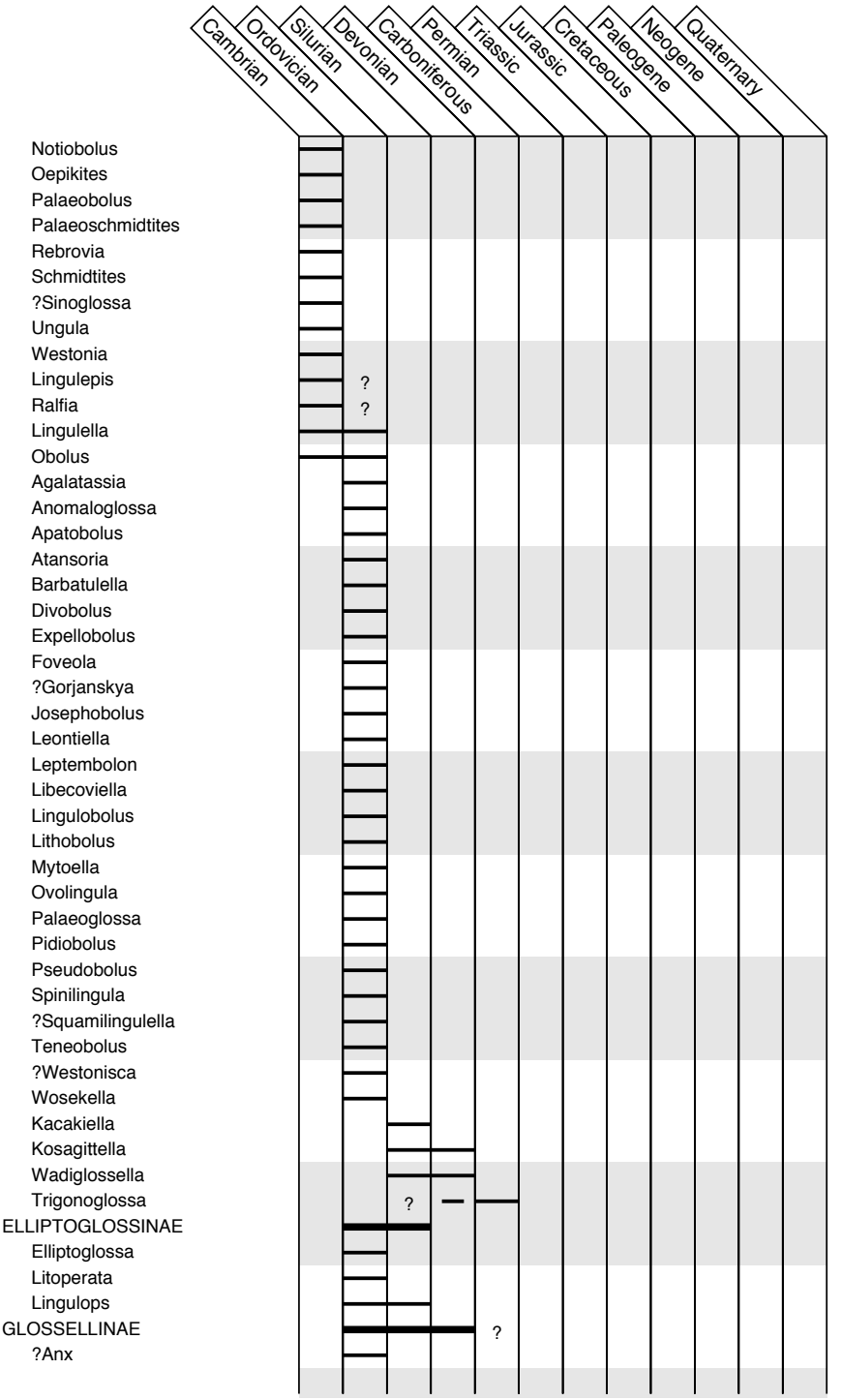


TABLE 41. *(Continued).*

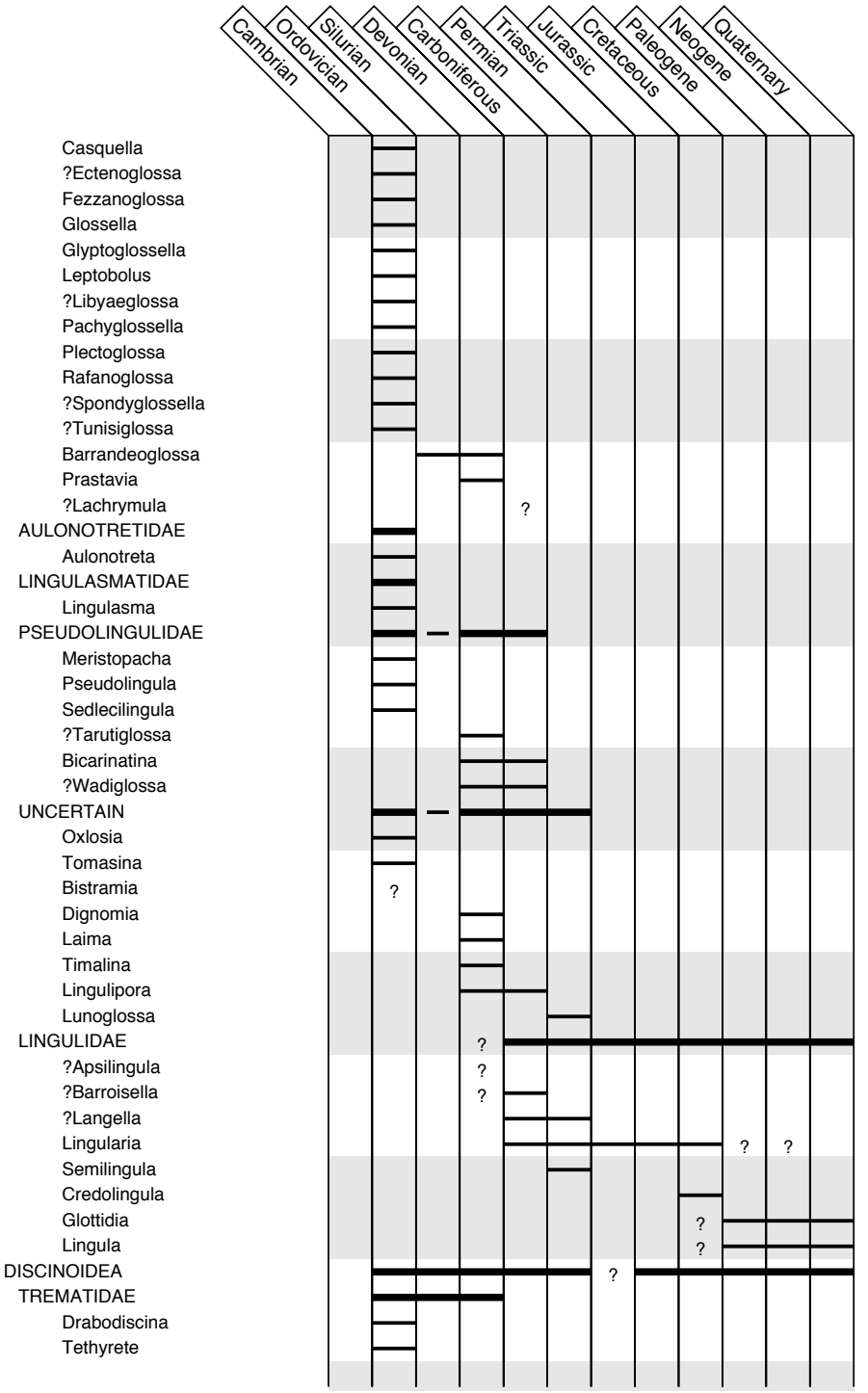


TABLE 41. *(Continued).*

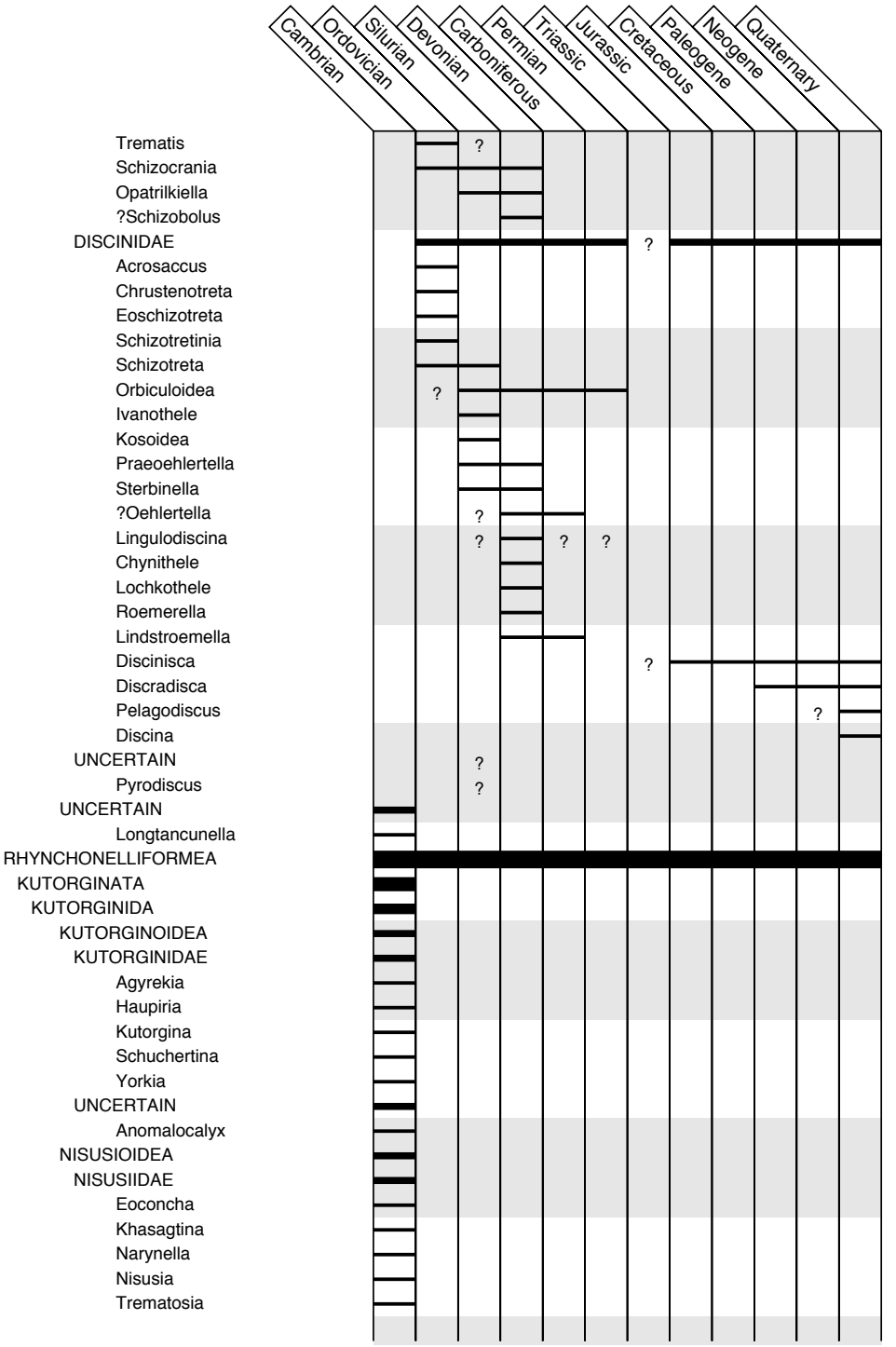


TABLE 41. *(Continued).*

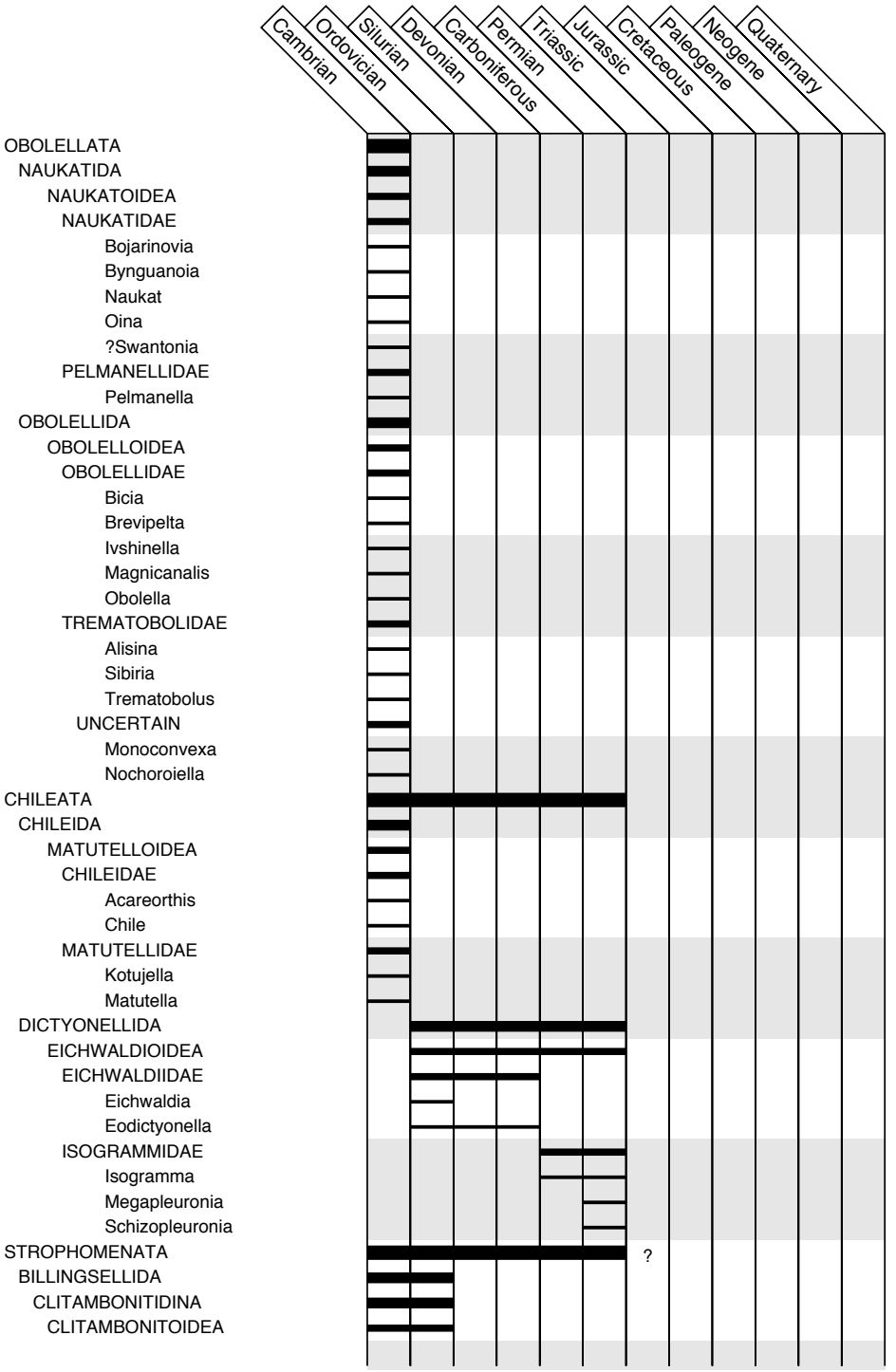


TABLE 41. *(Continued).*

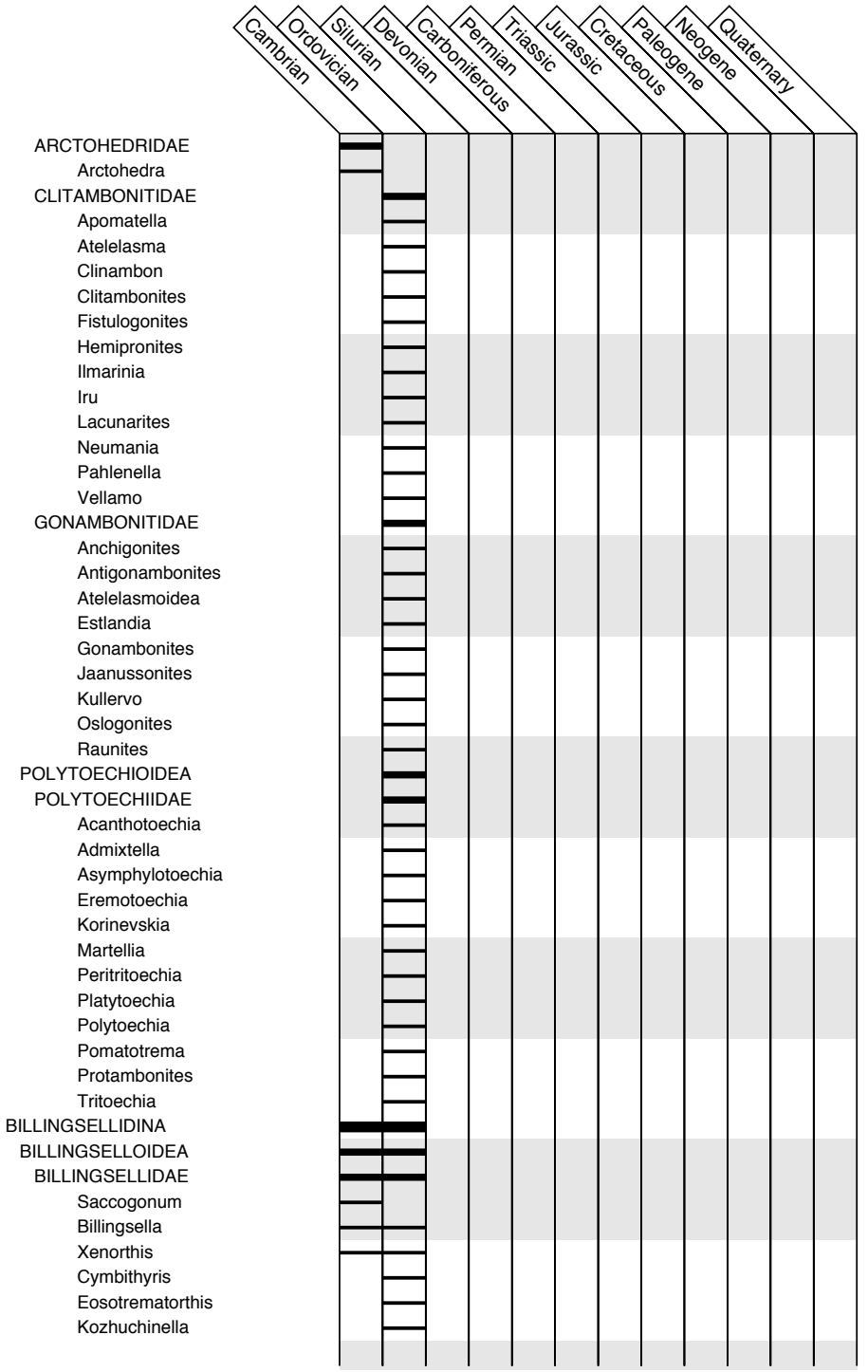


TABLE 41. *(Continued).*

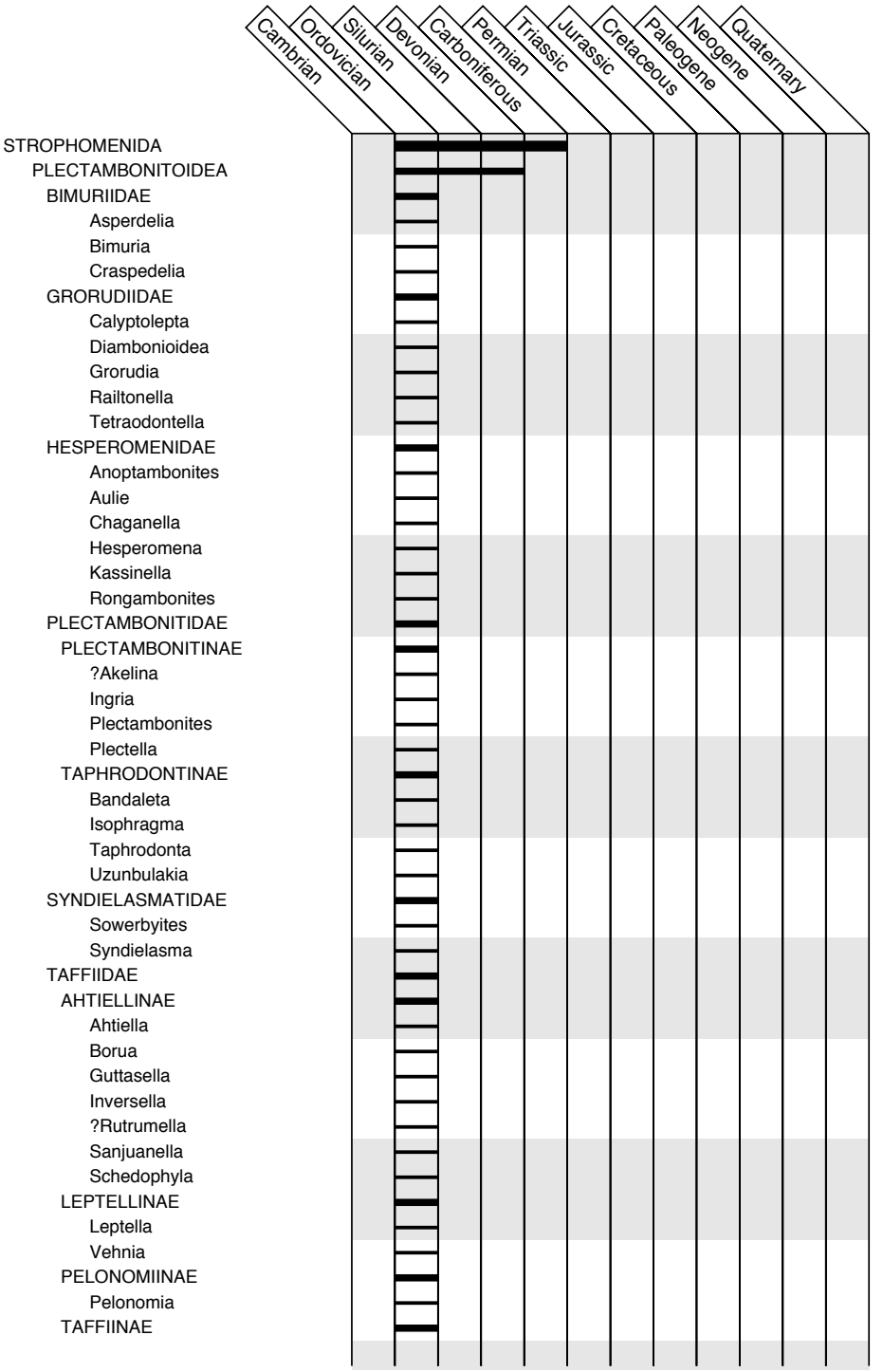


TABLE 41. *(Continued).*

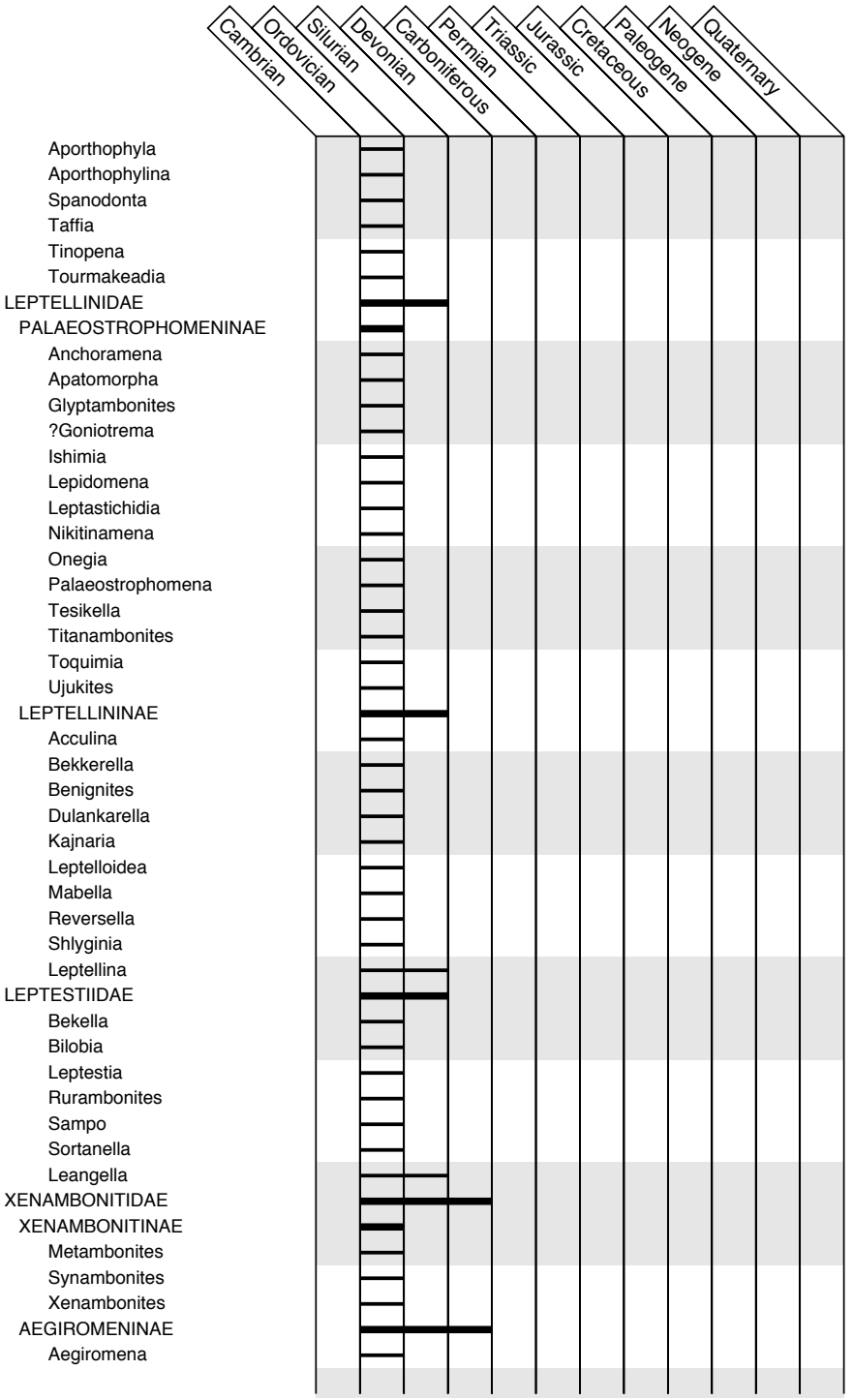


TABLE 41. *(Continued).*

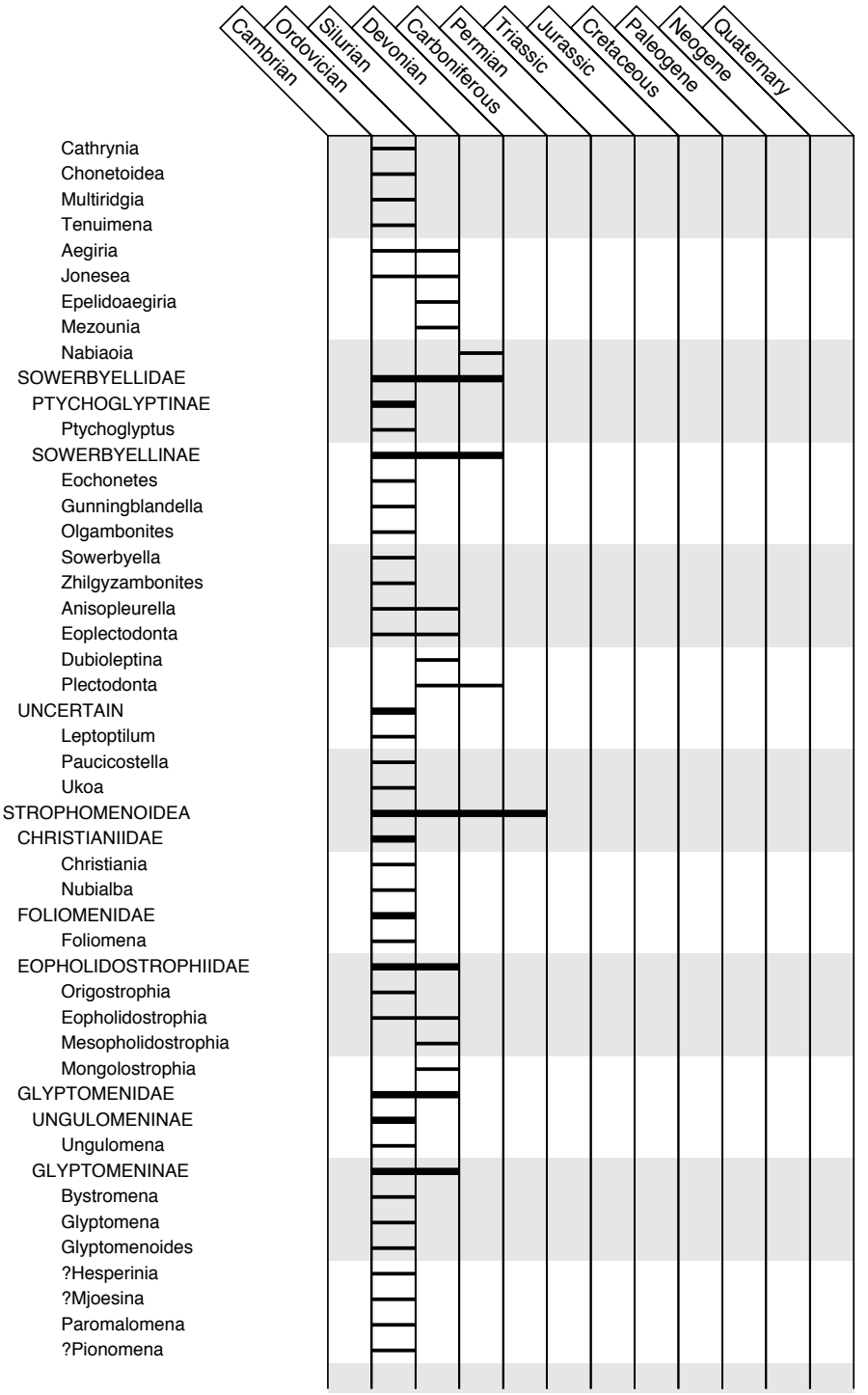


TABLE 41. *(Continued).*

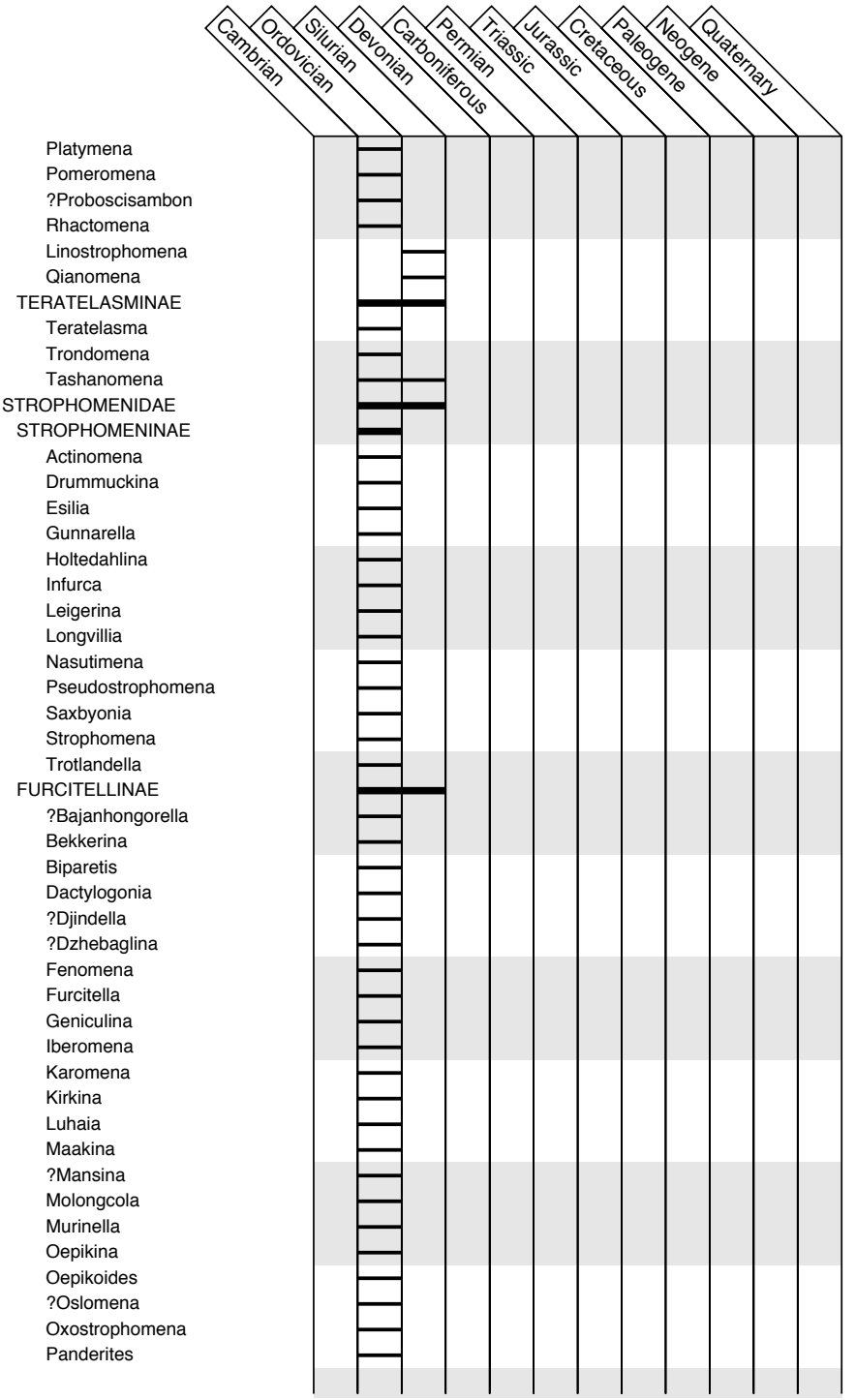


TABLE 41. *(Continued).*

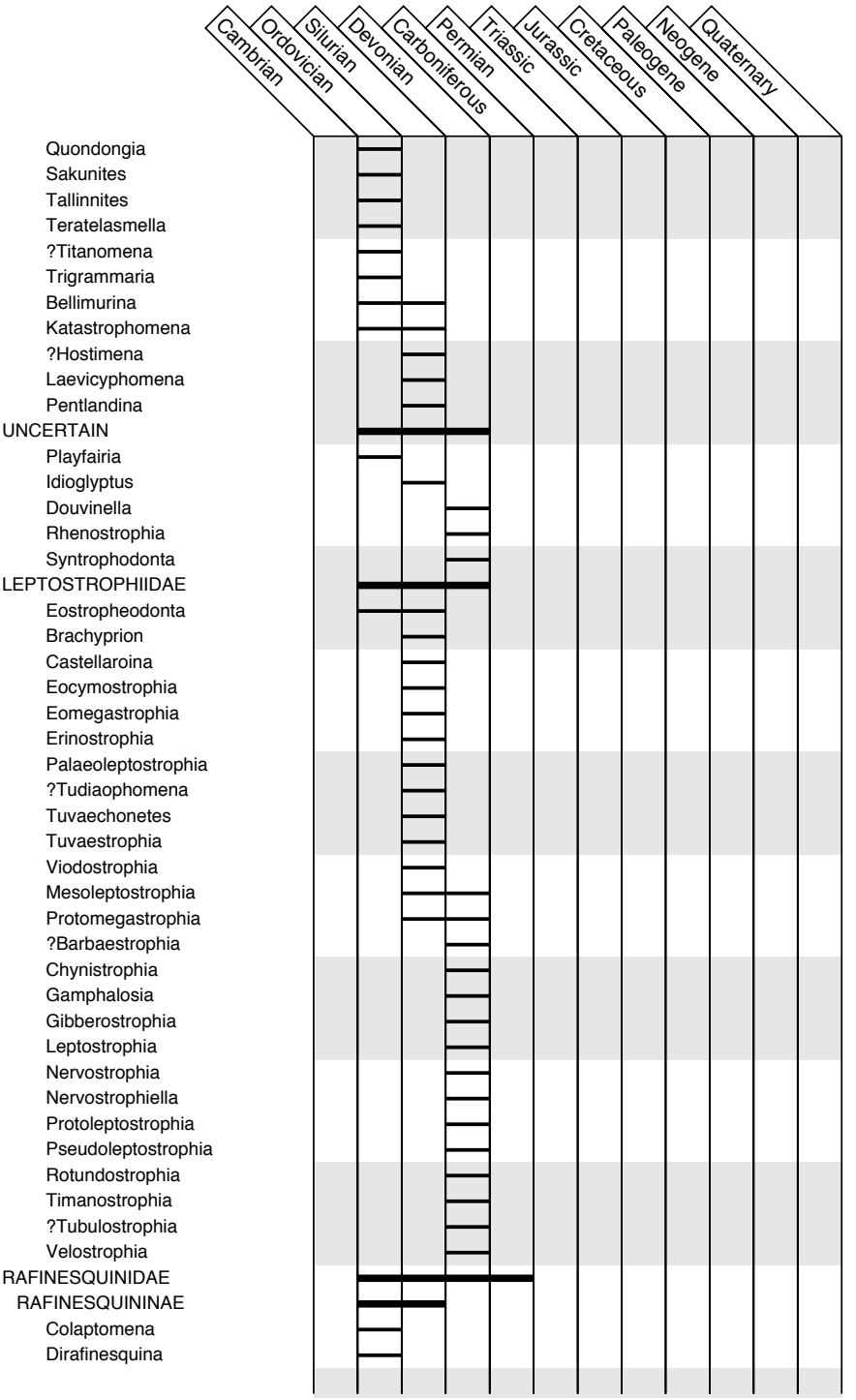


TABLE 41. *(Continued).*

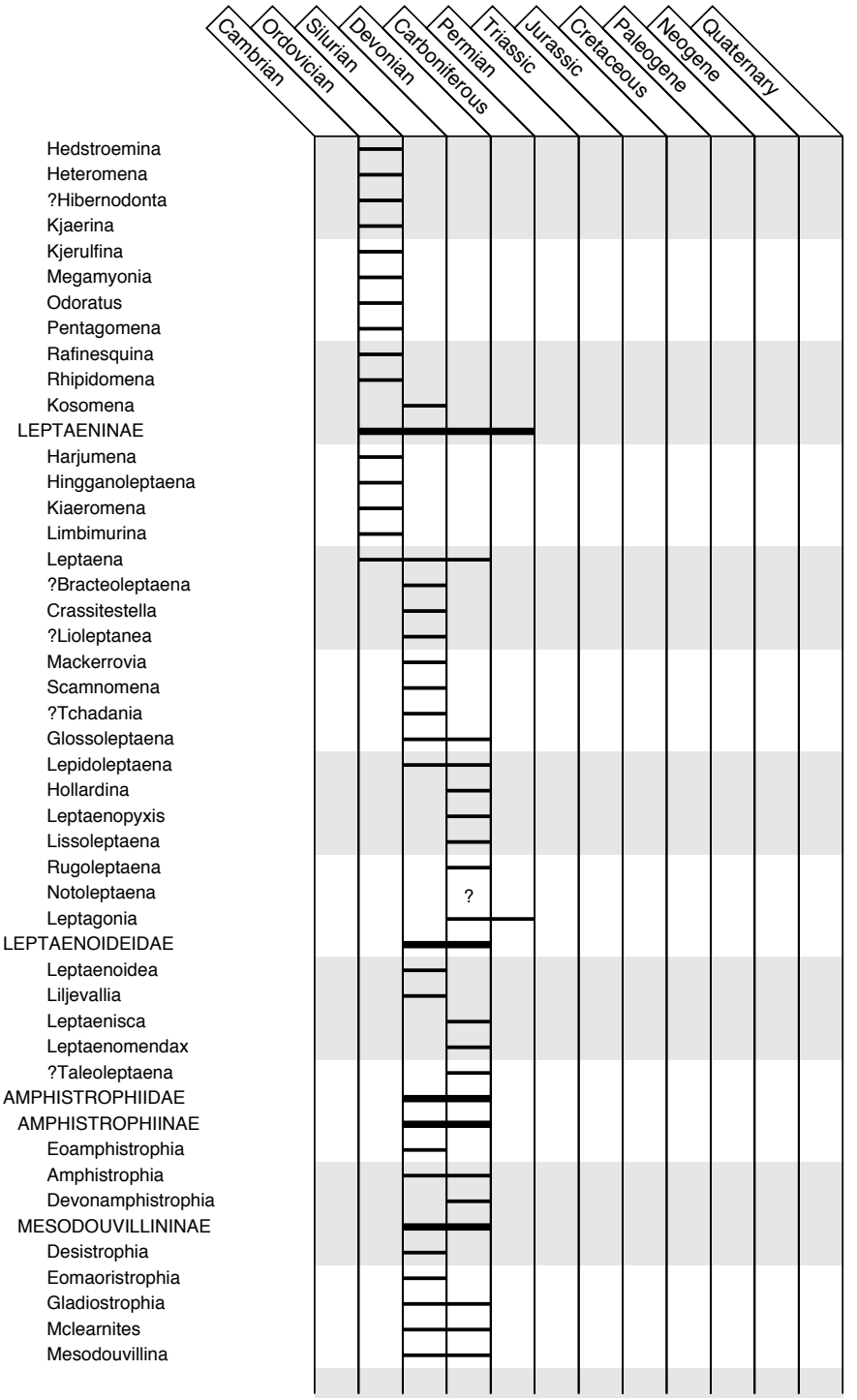
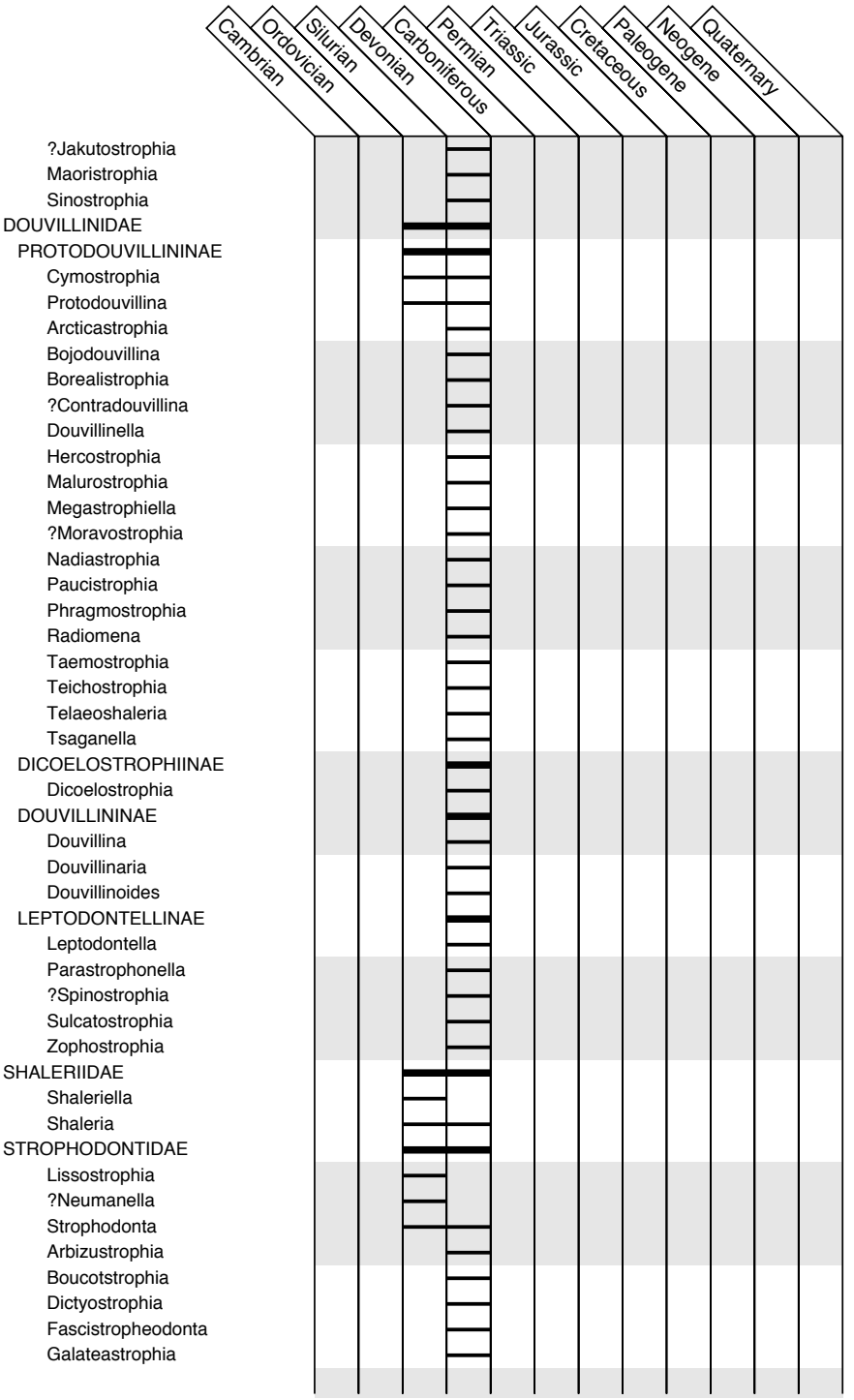


TABLE 41. *(Continued).*



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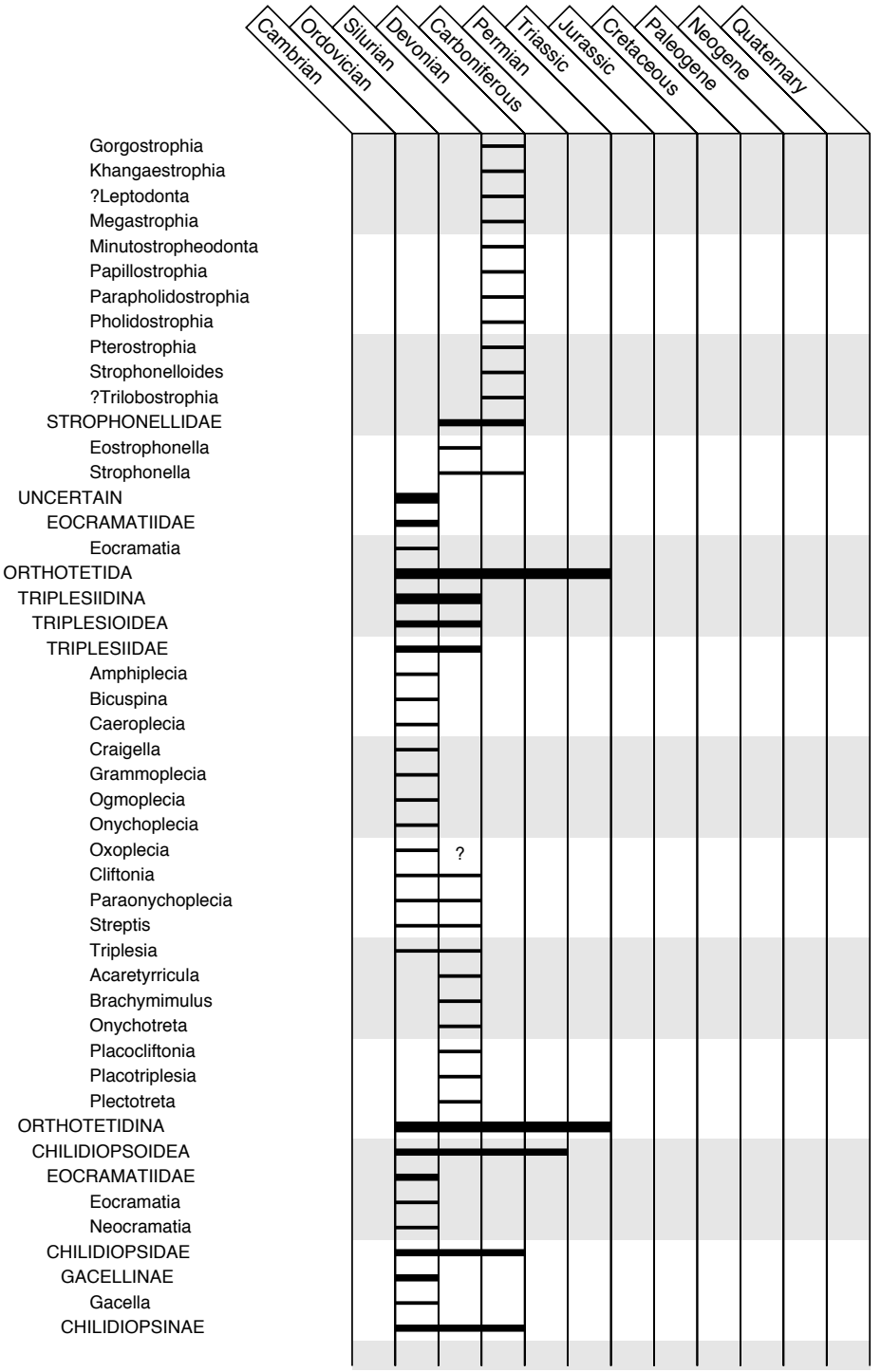

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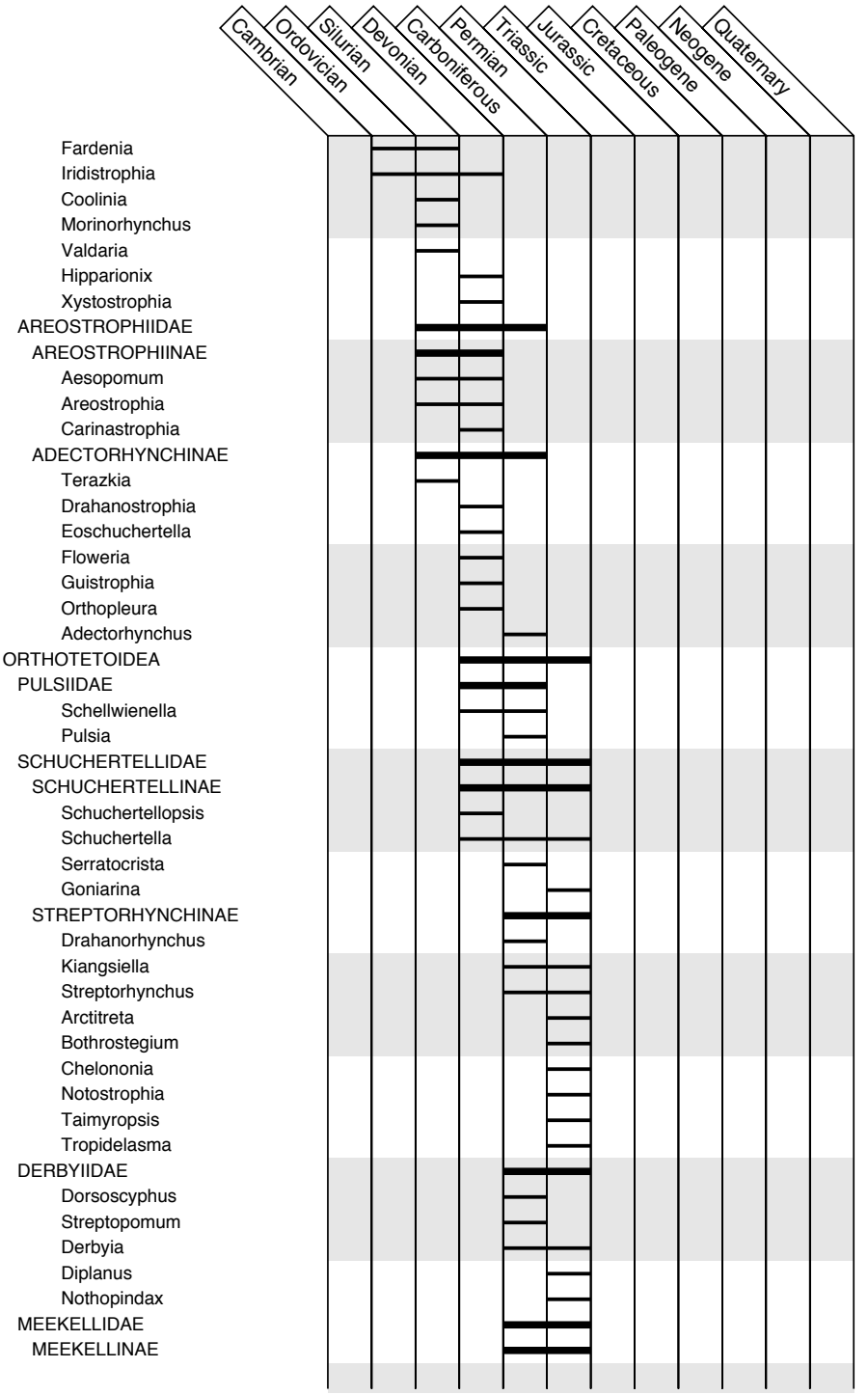

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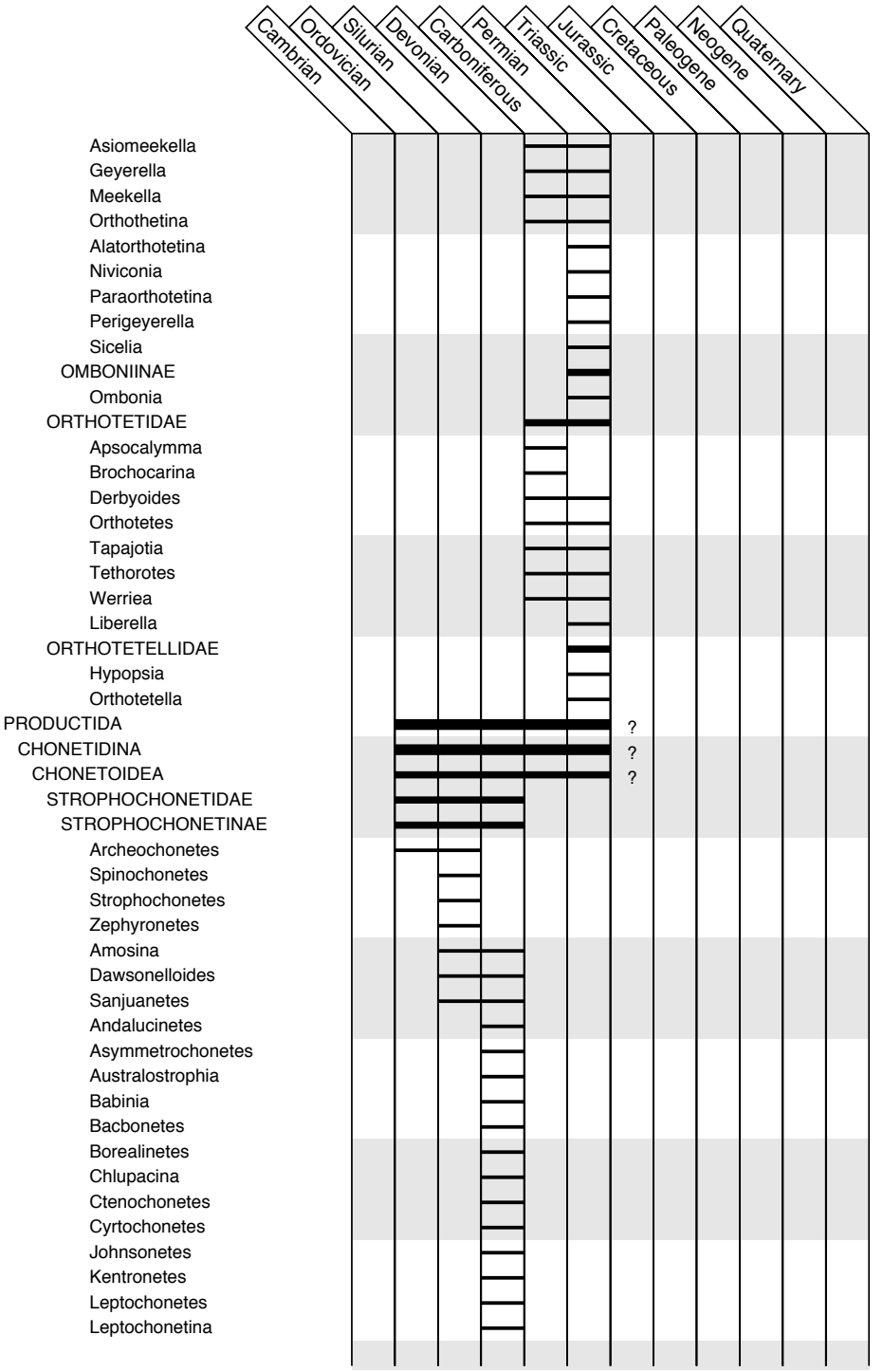

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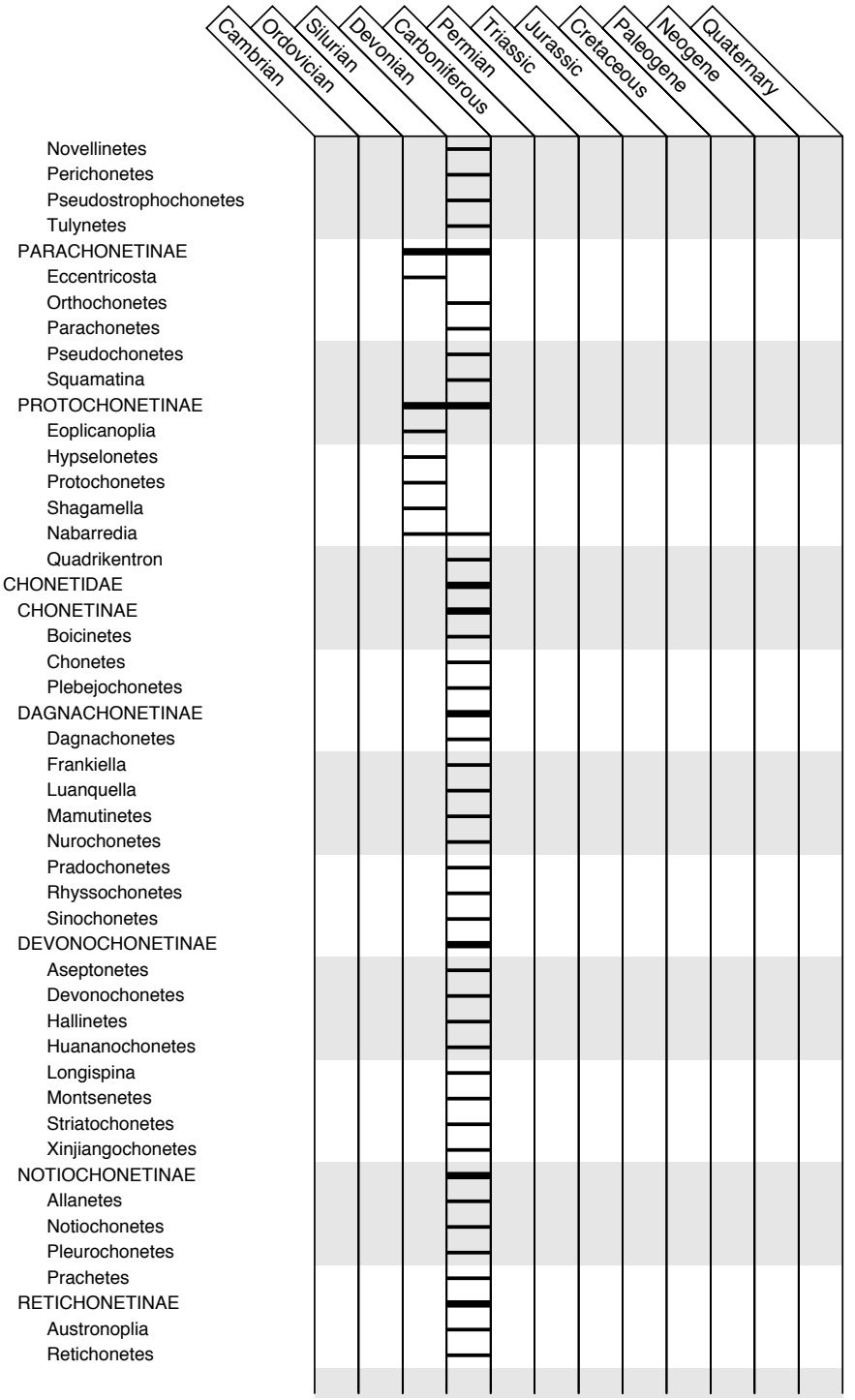


TABLE 41. *(Continued).*

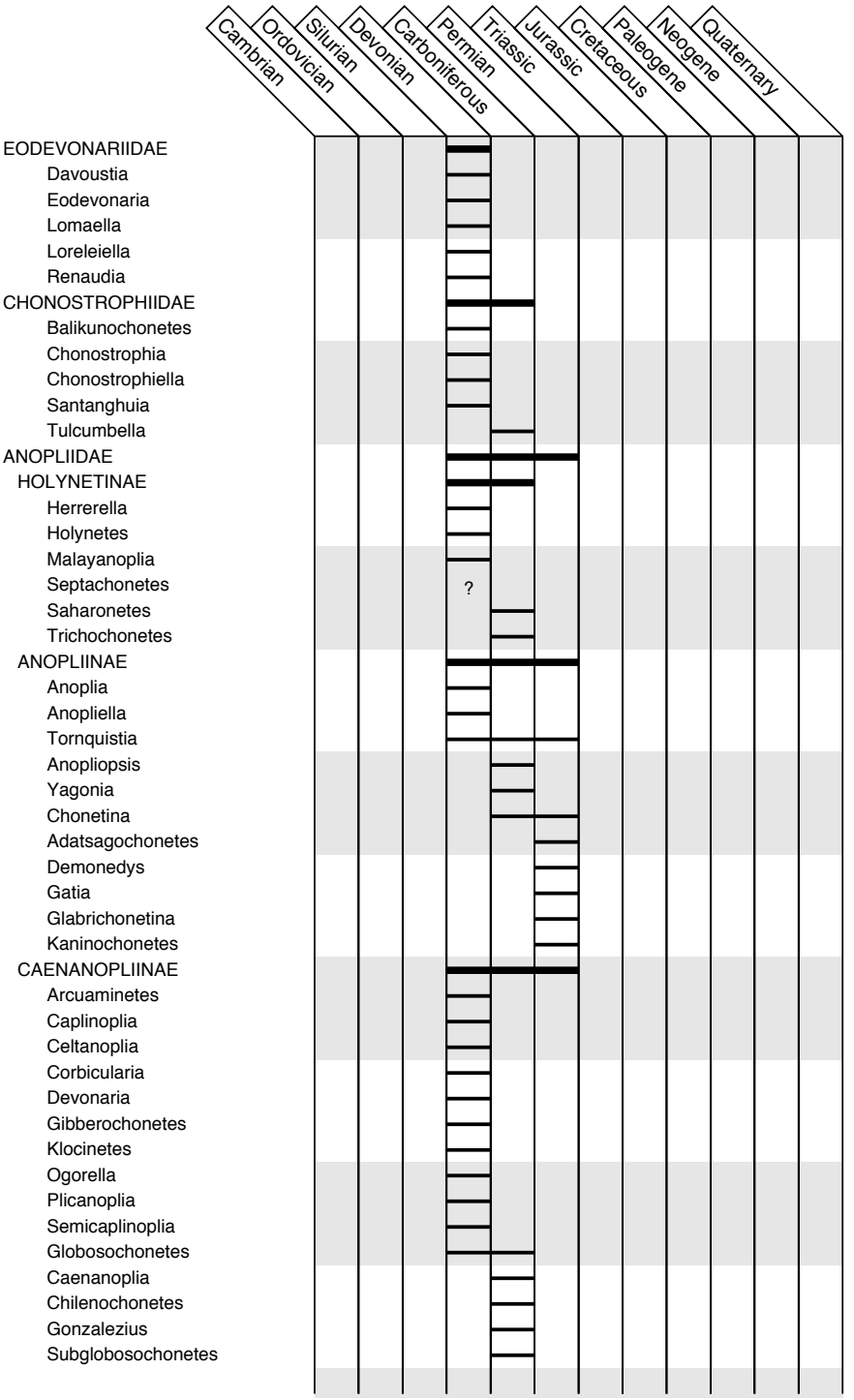
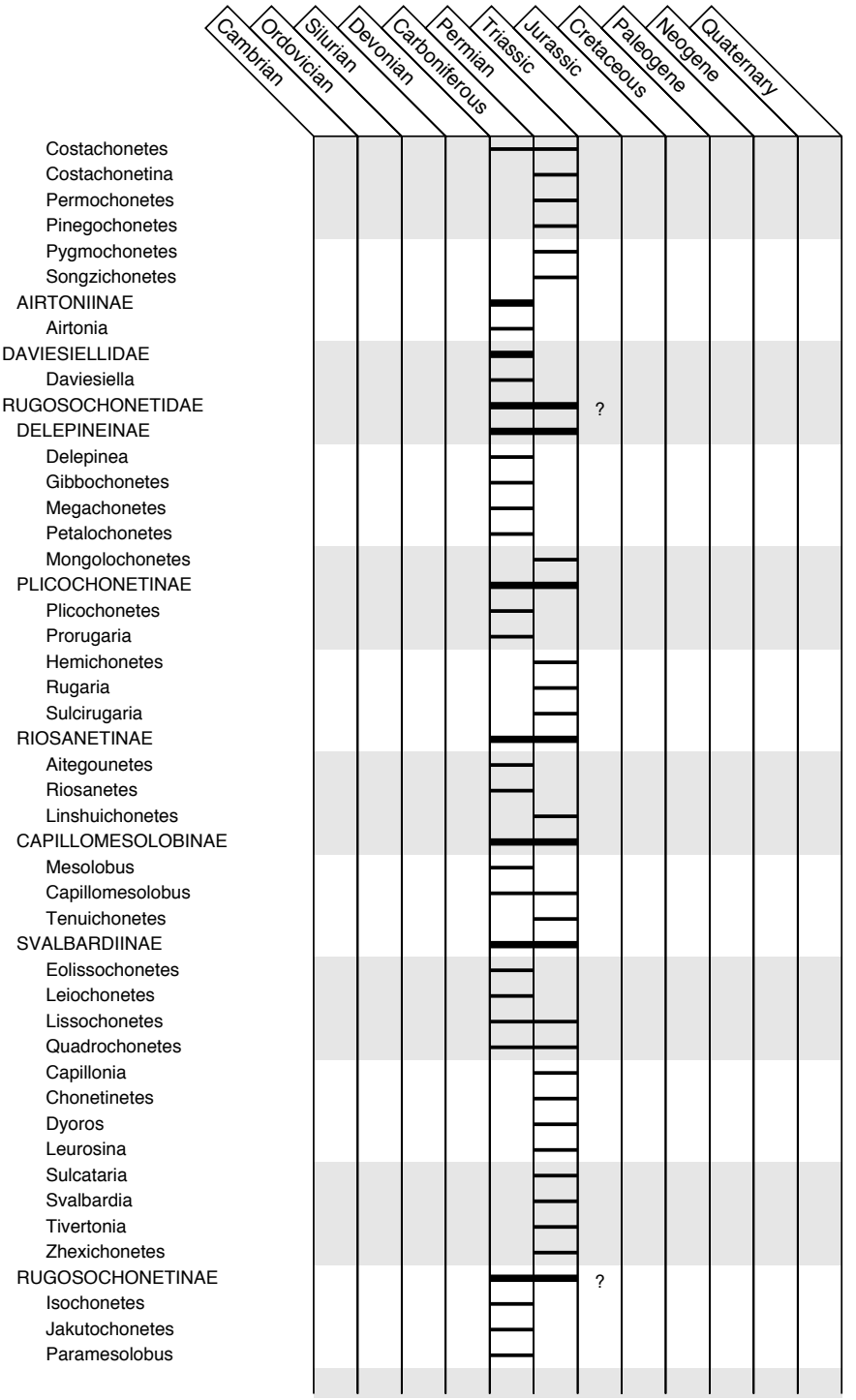


TABLE 41. *(Continued).*



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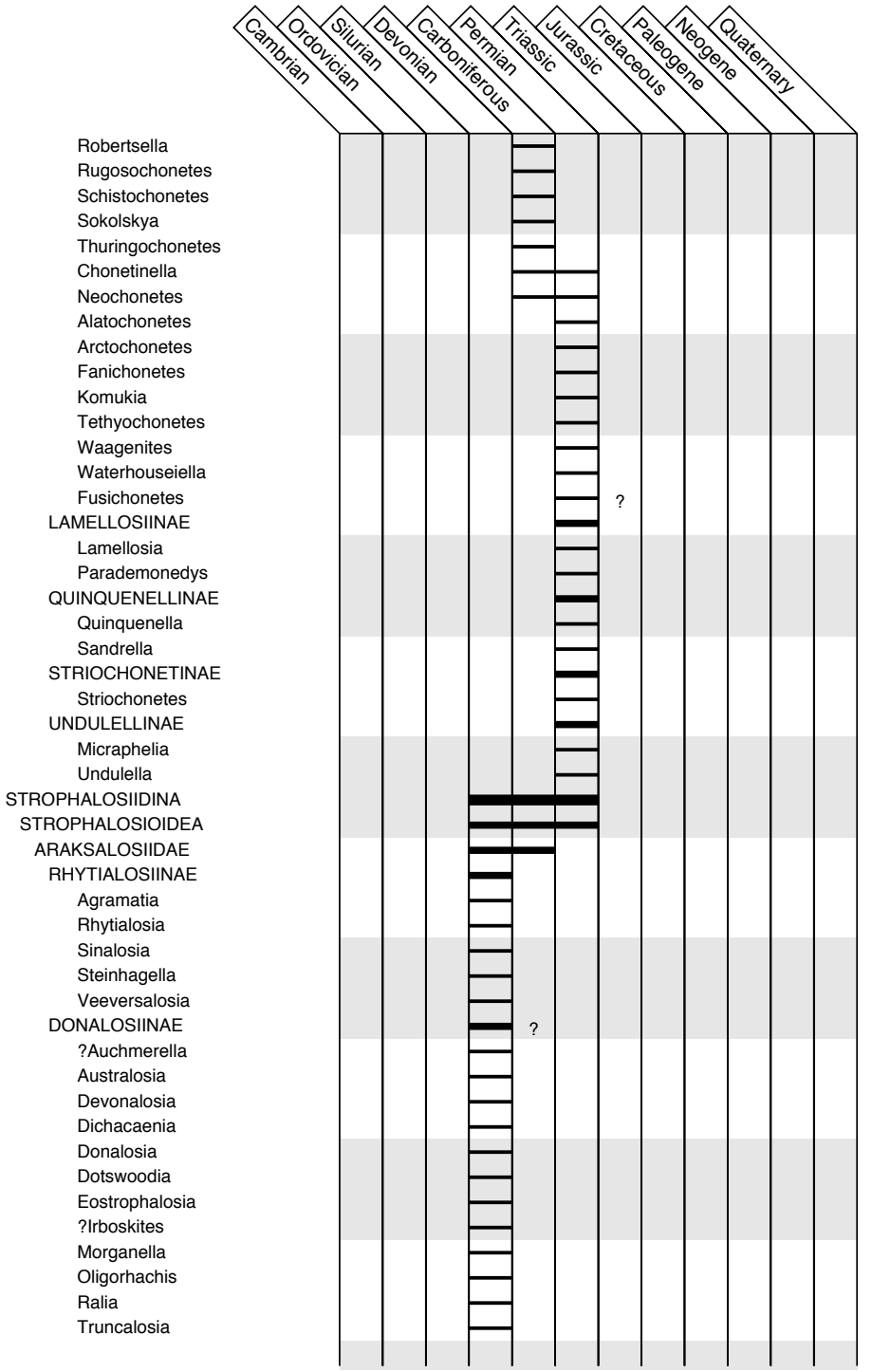

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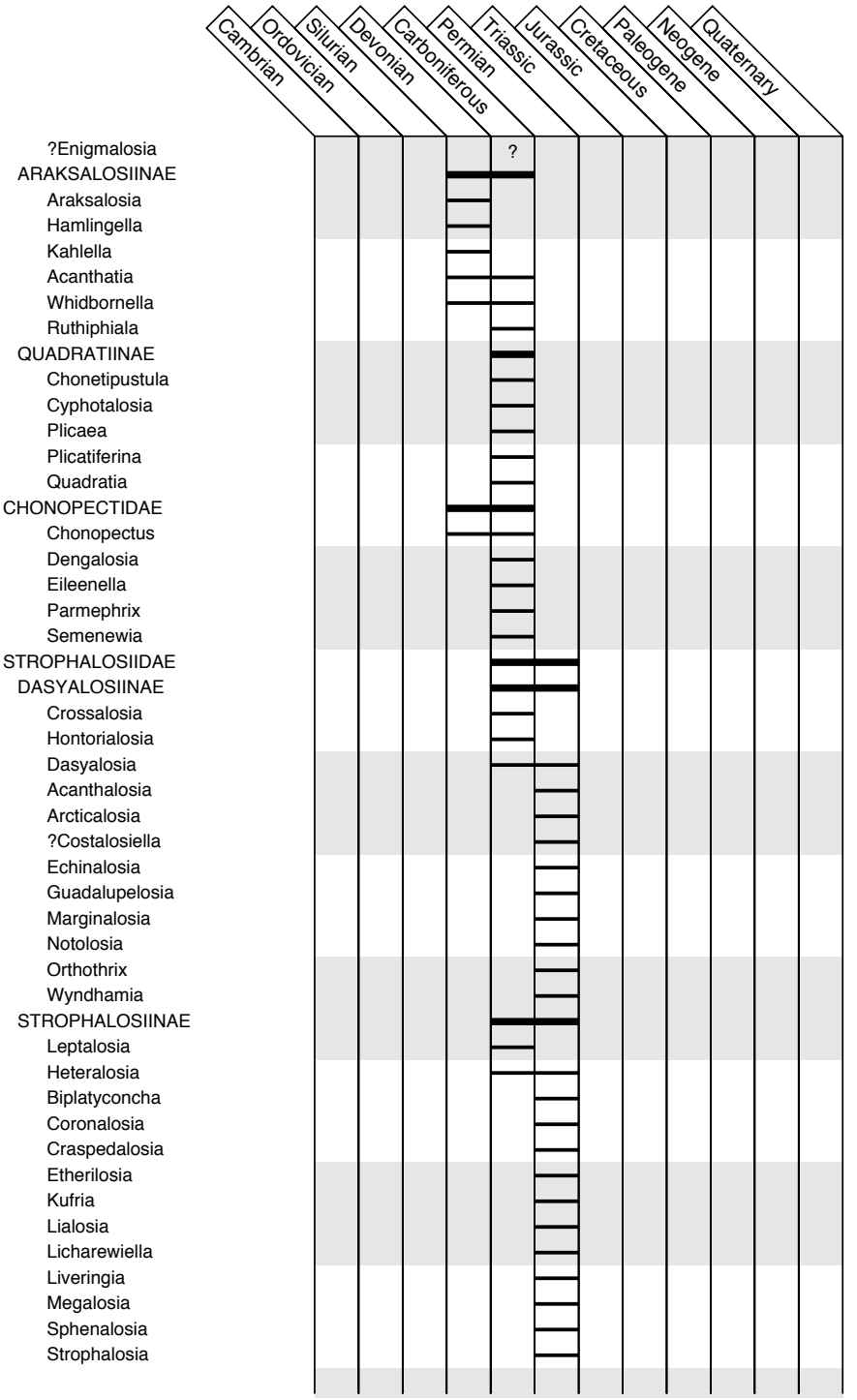

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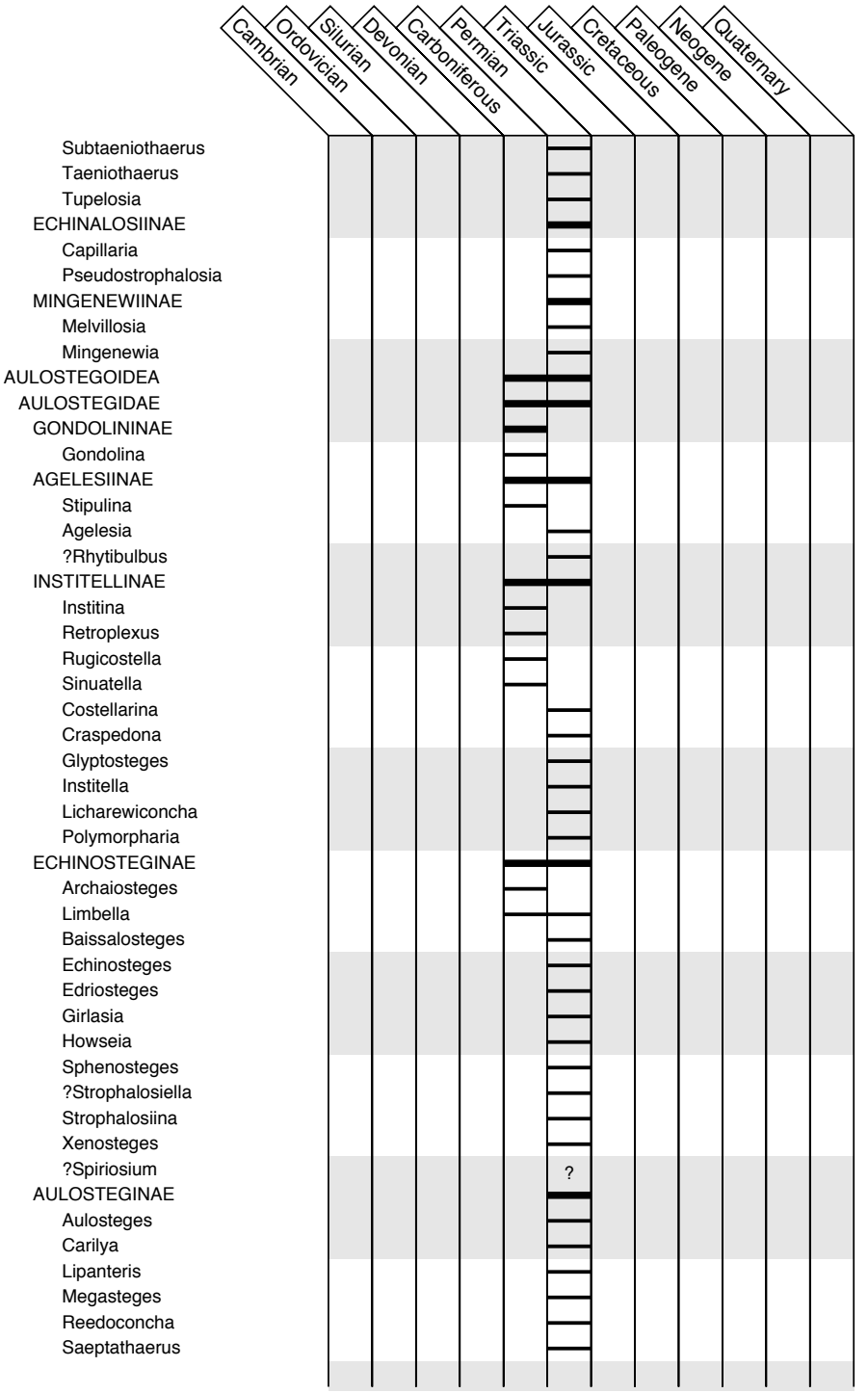

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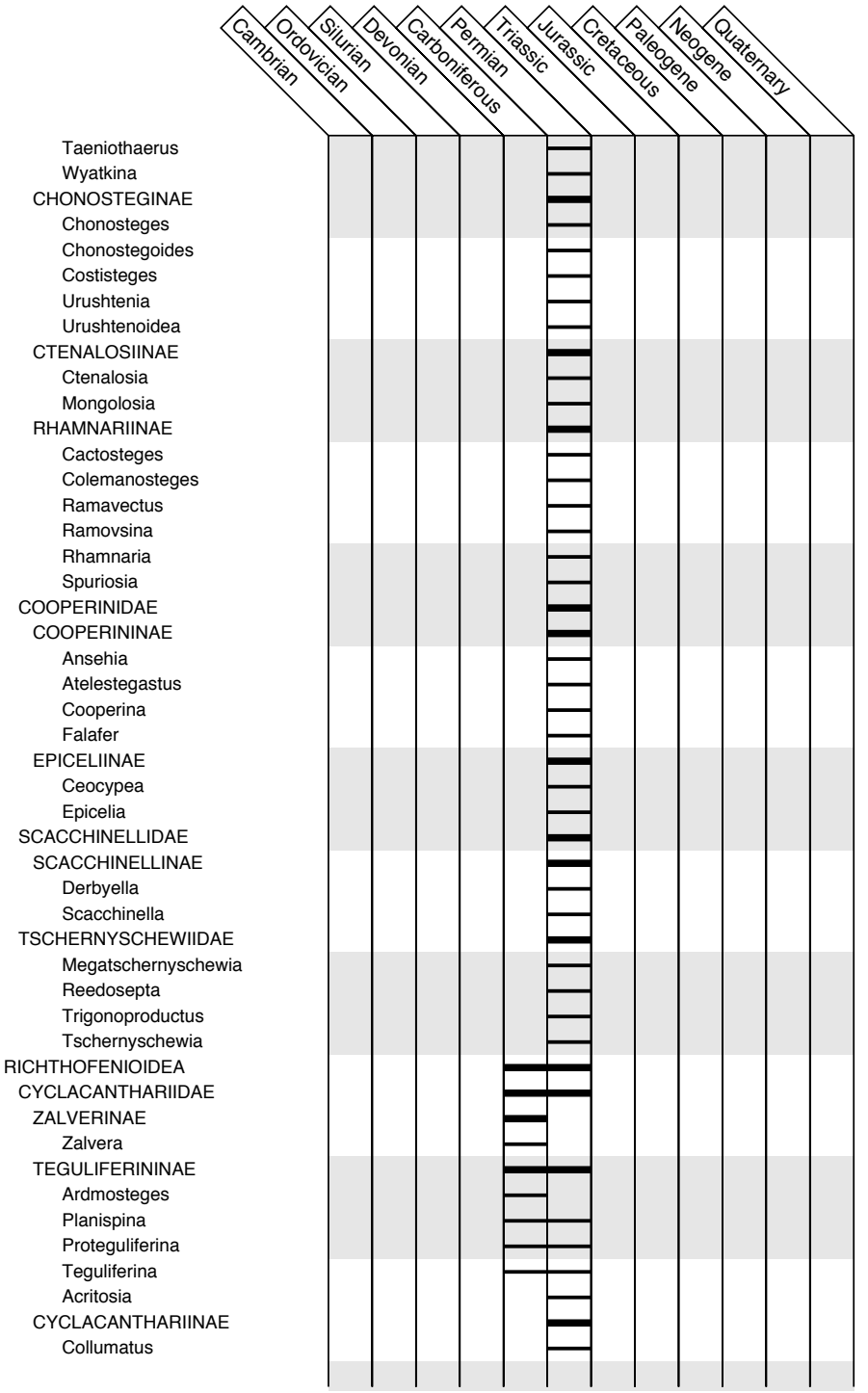

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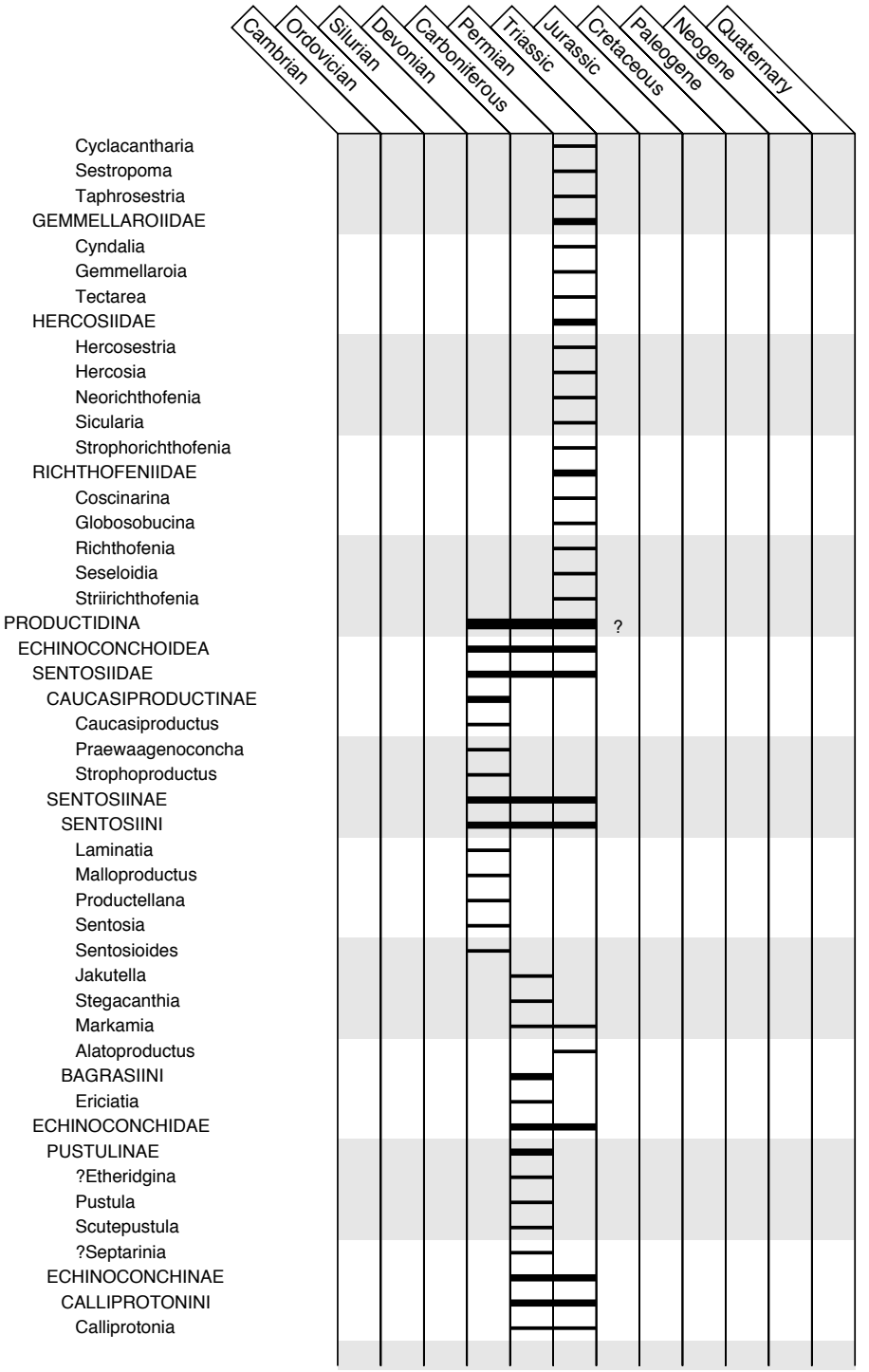

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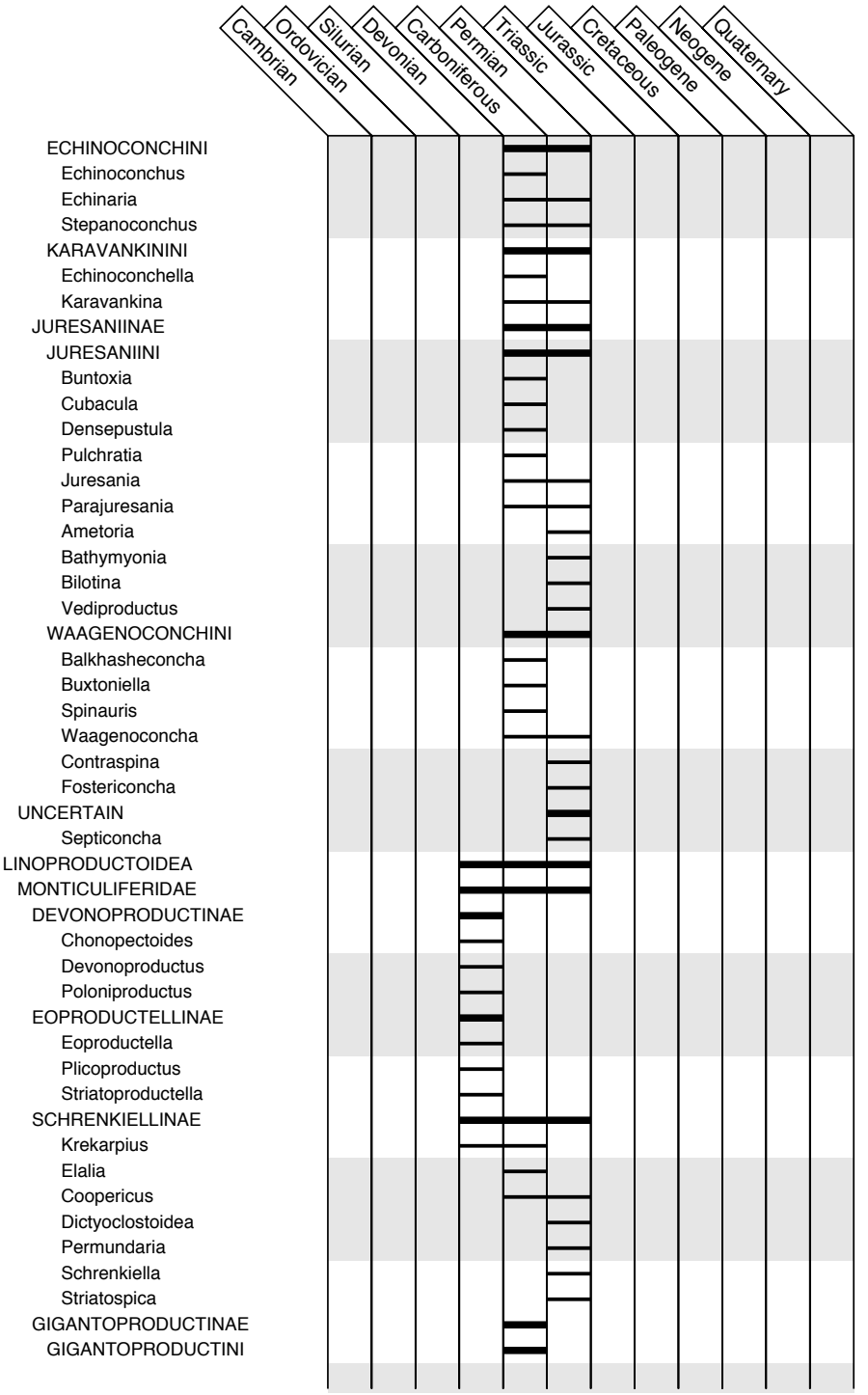


TABLE 41. *(Continued).*

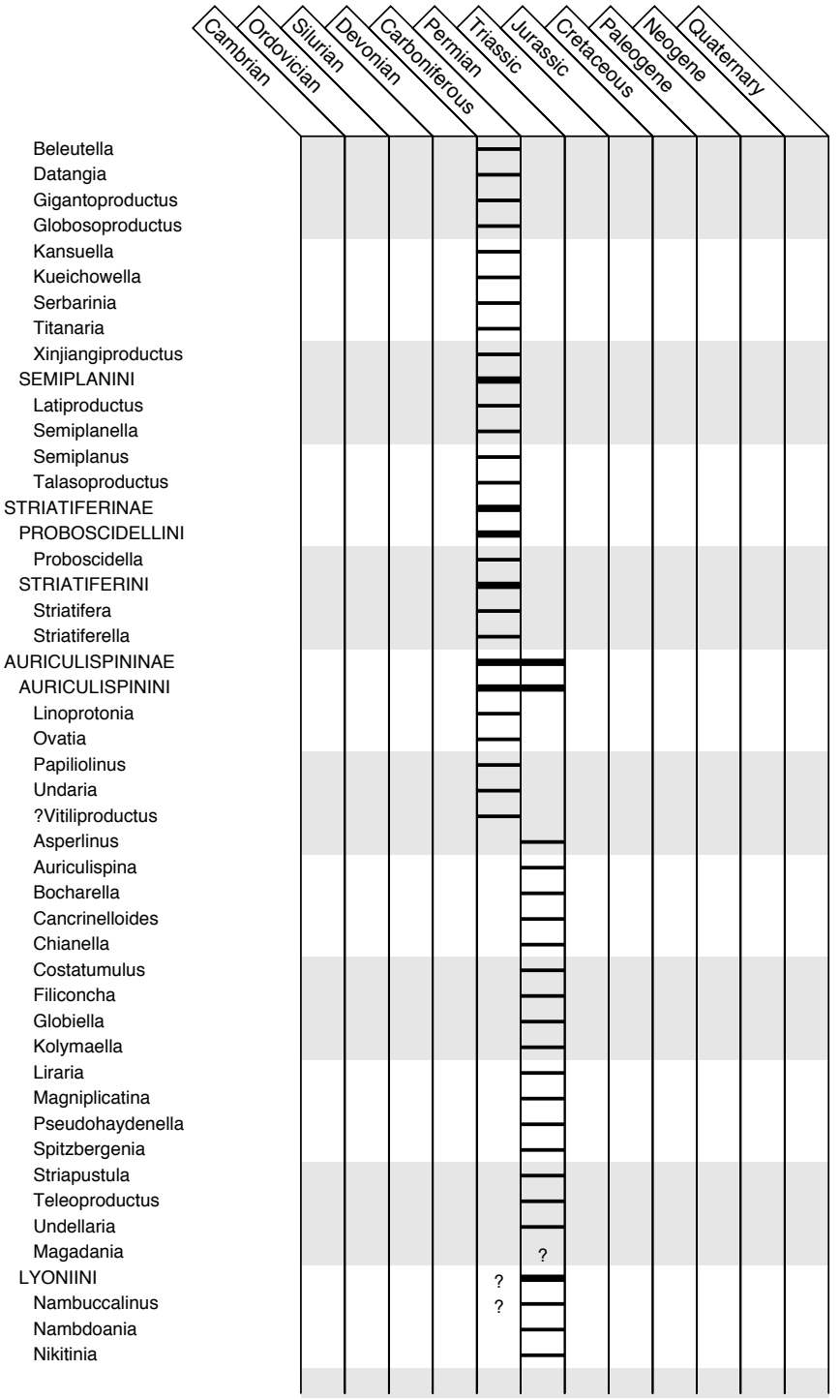


TABLE 41. *(Continued).*

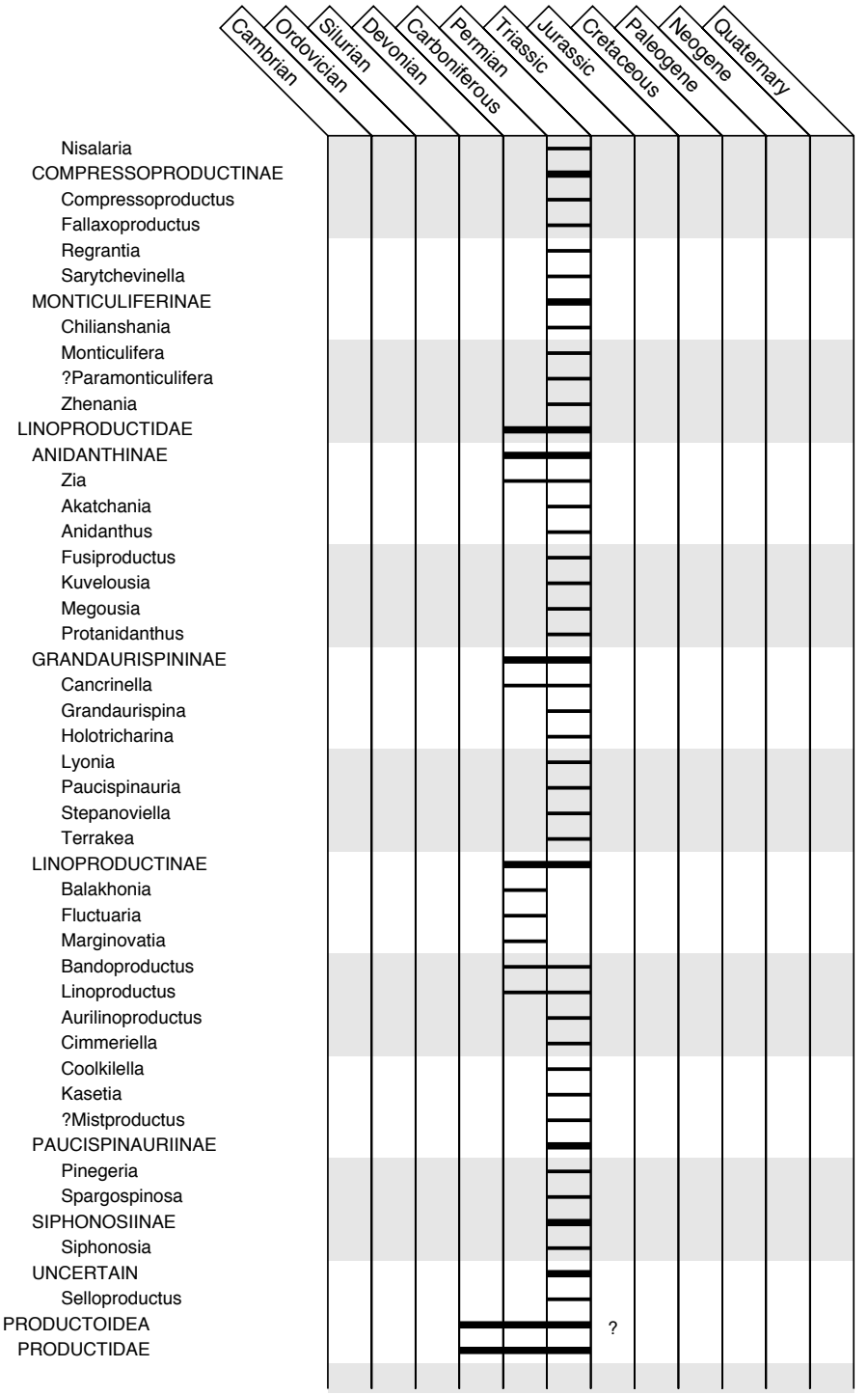
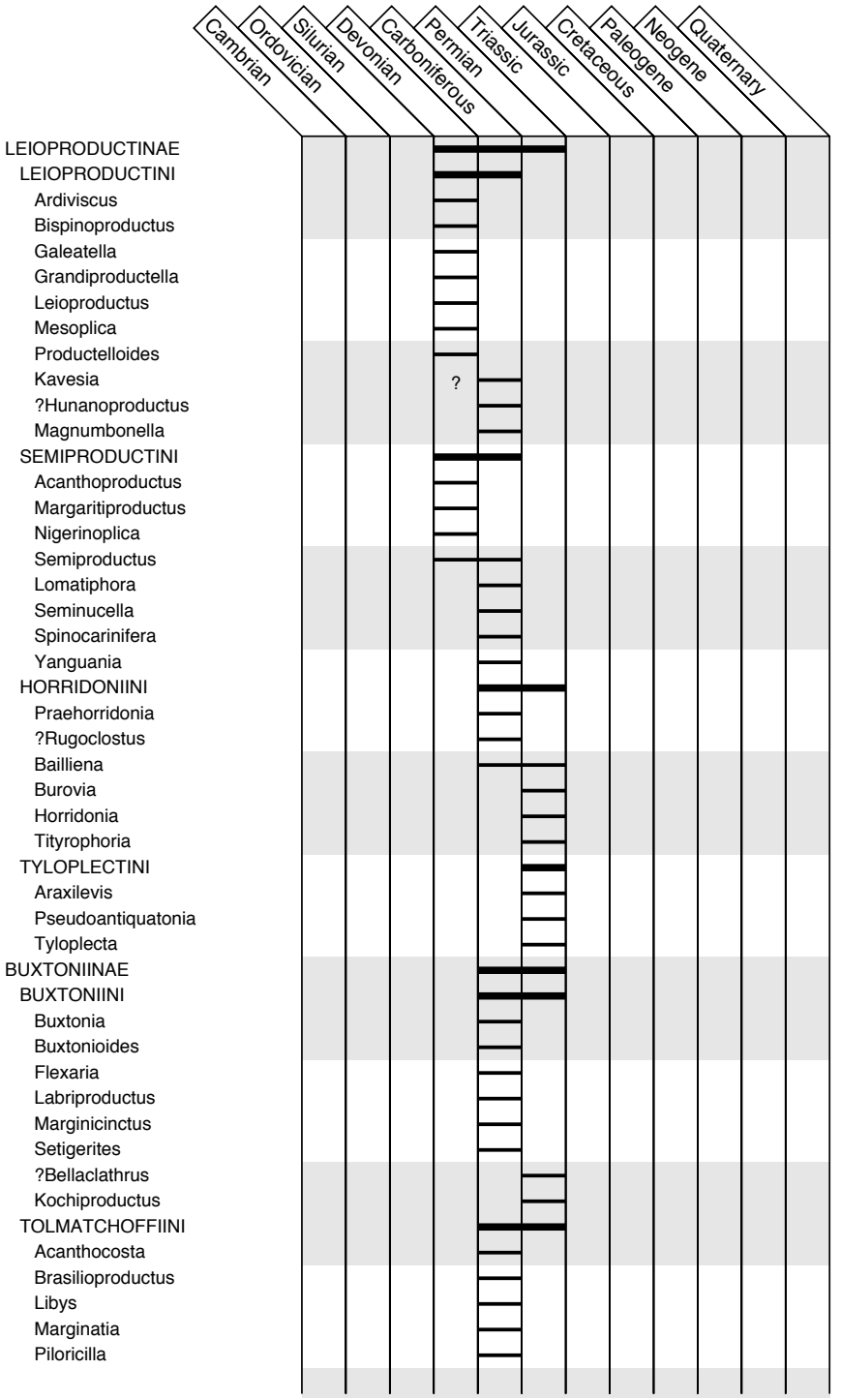


TABLE 41. *(Continued).*



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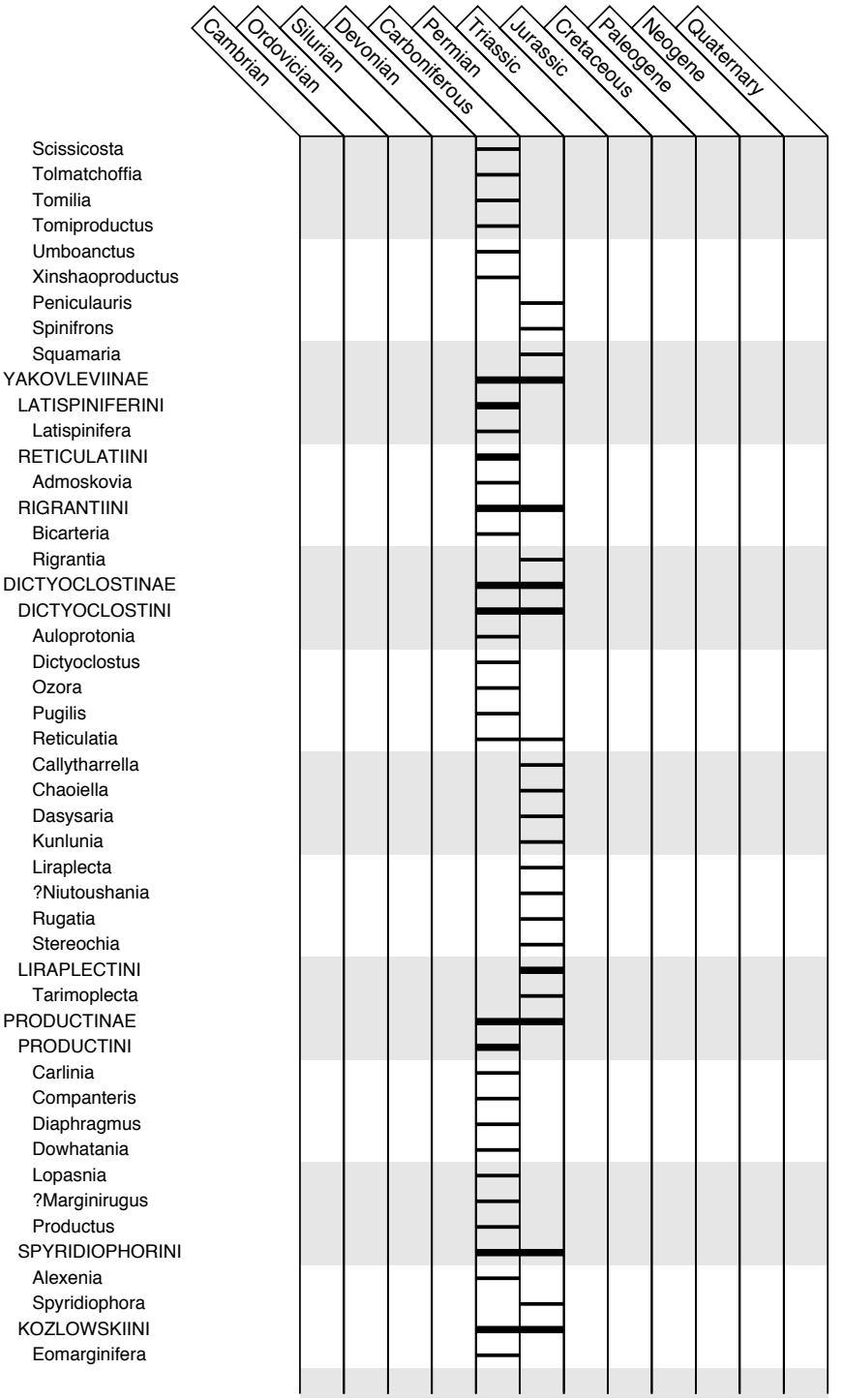

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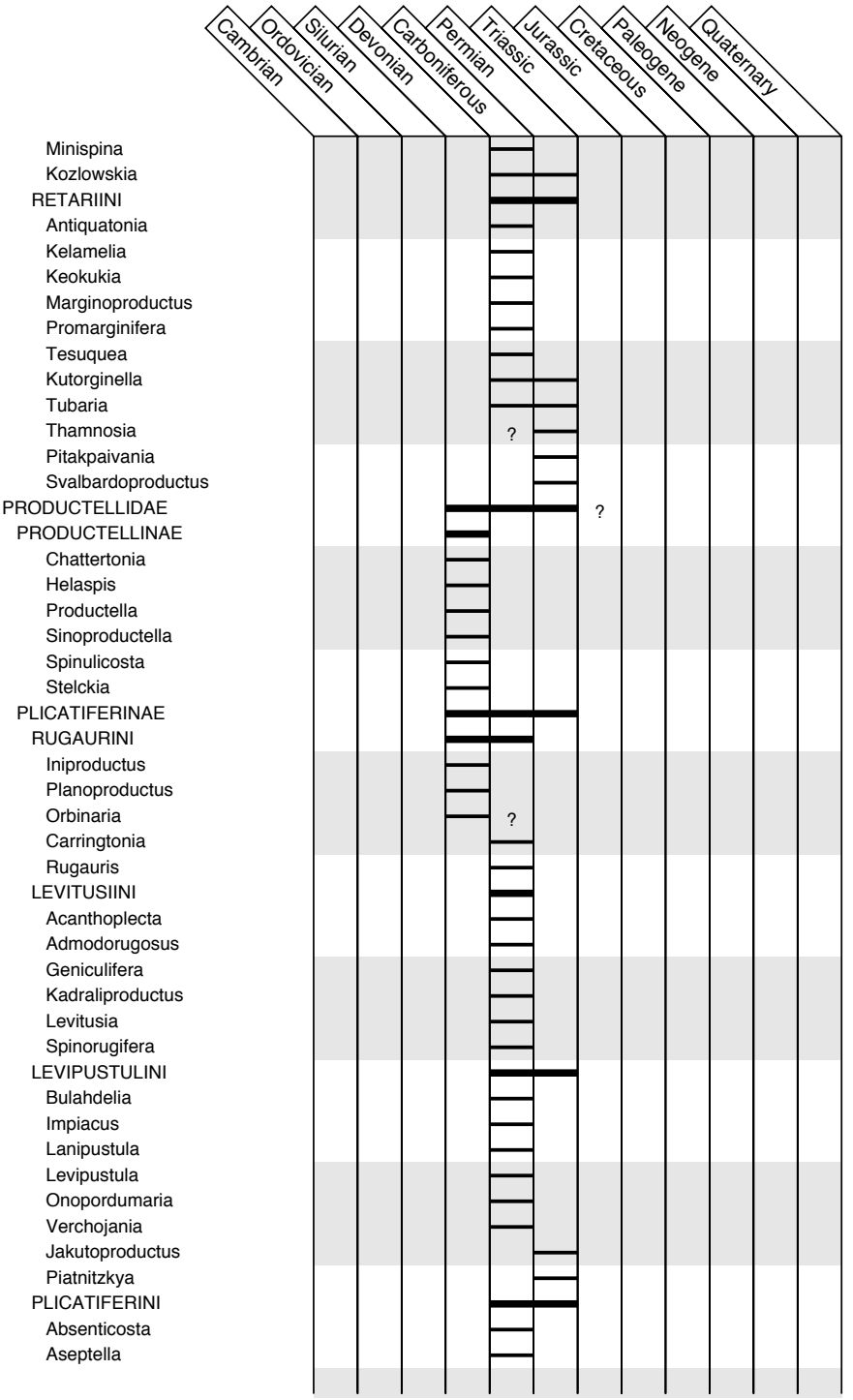

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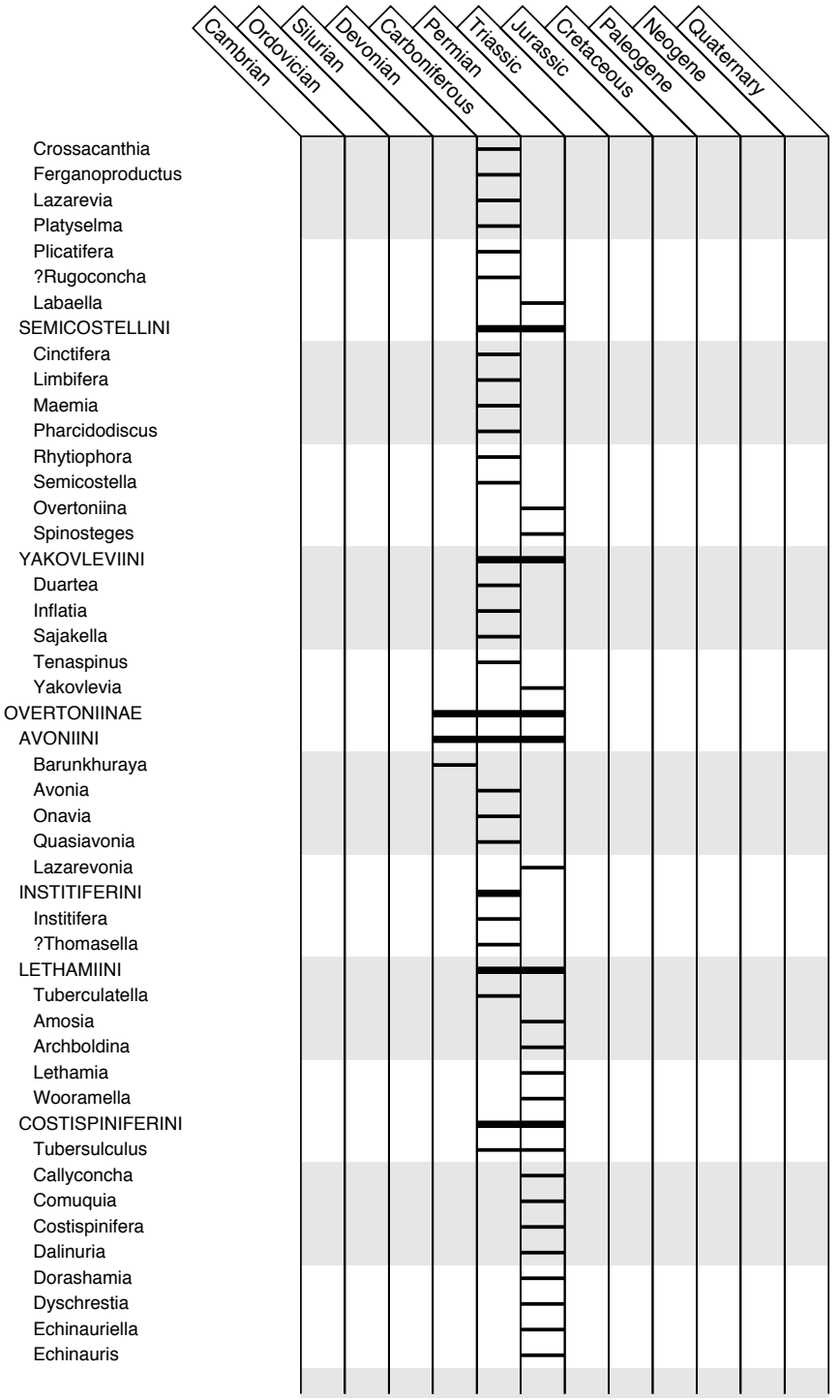

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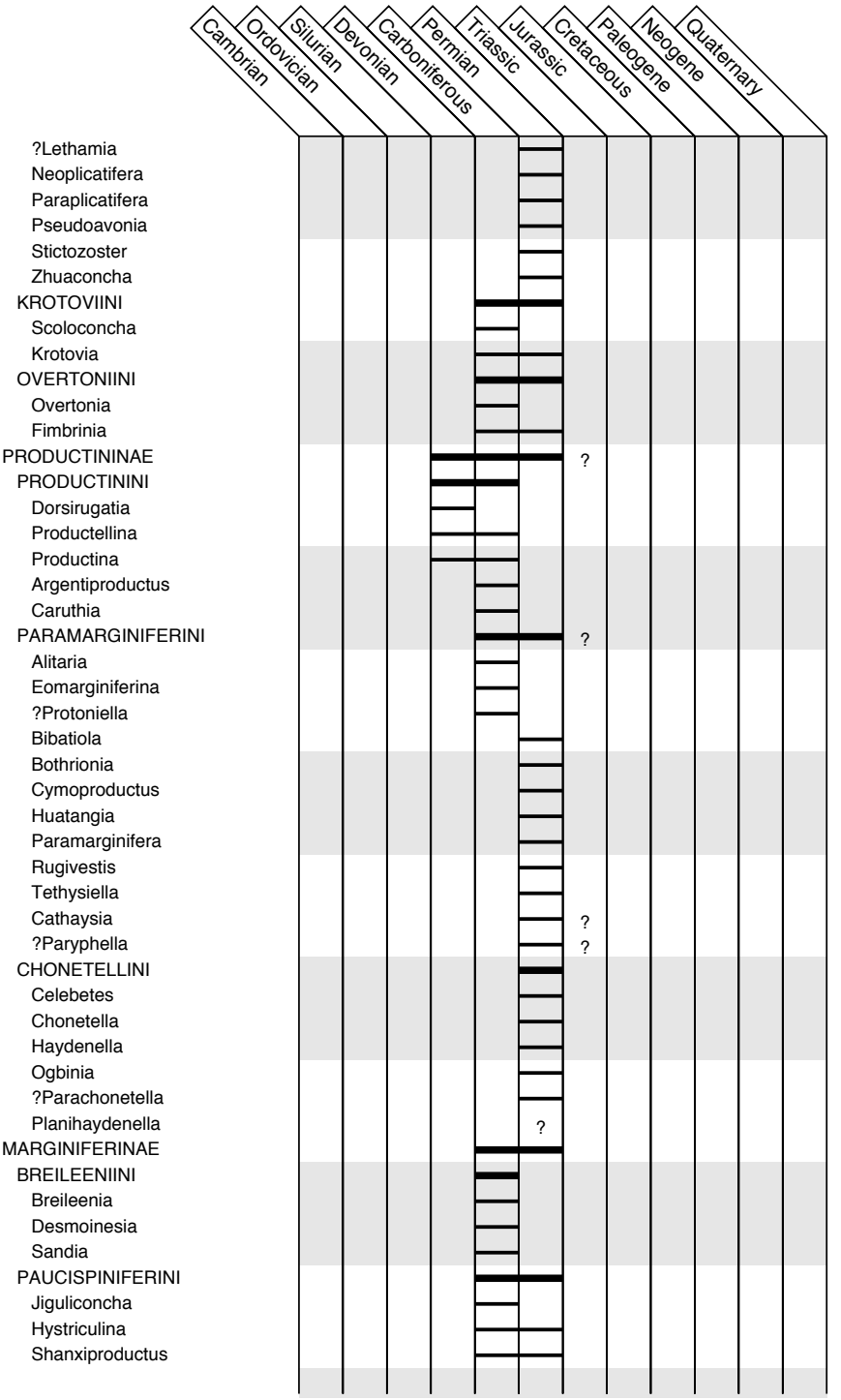
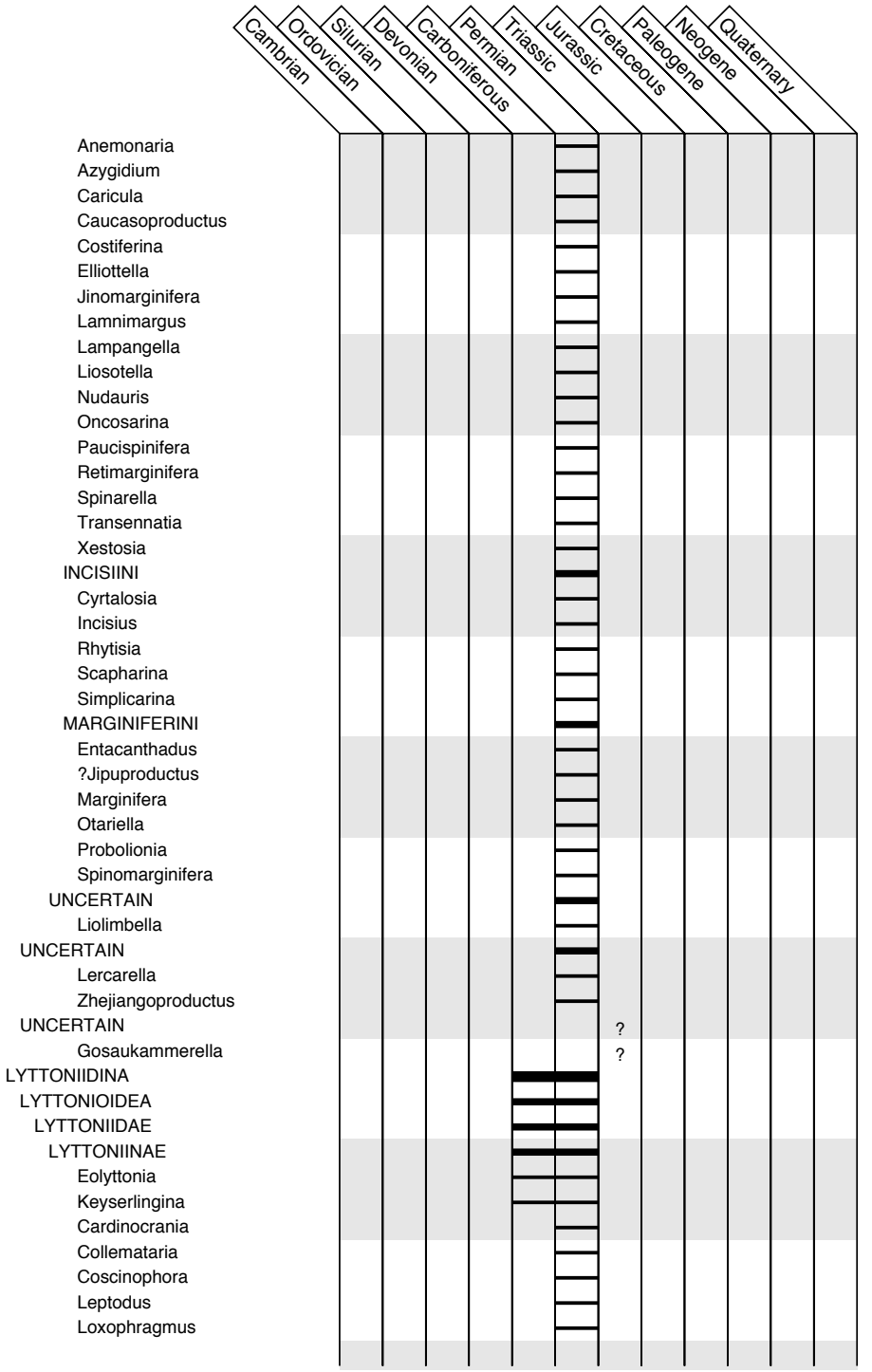


TABLE 41. *(Continued).*



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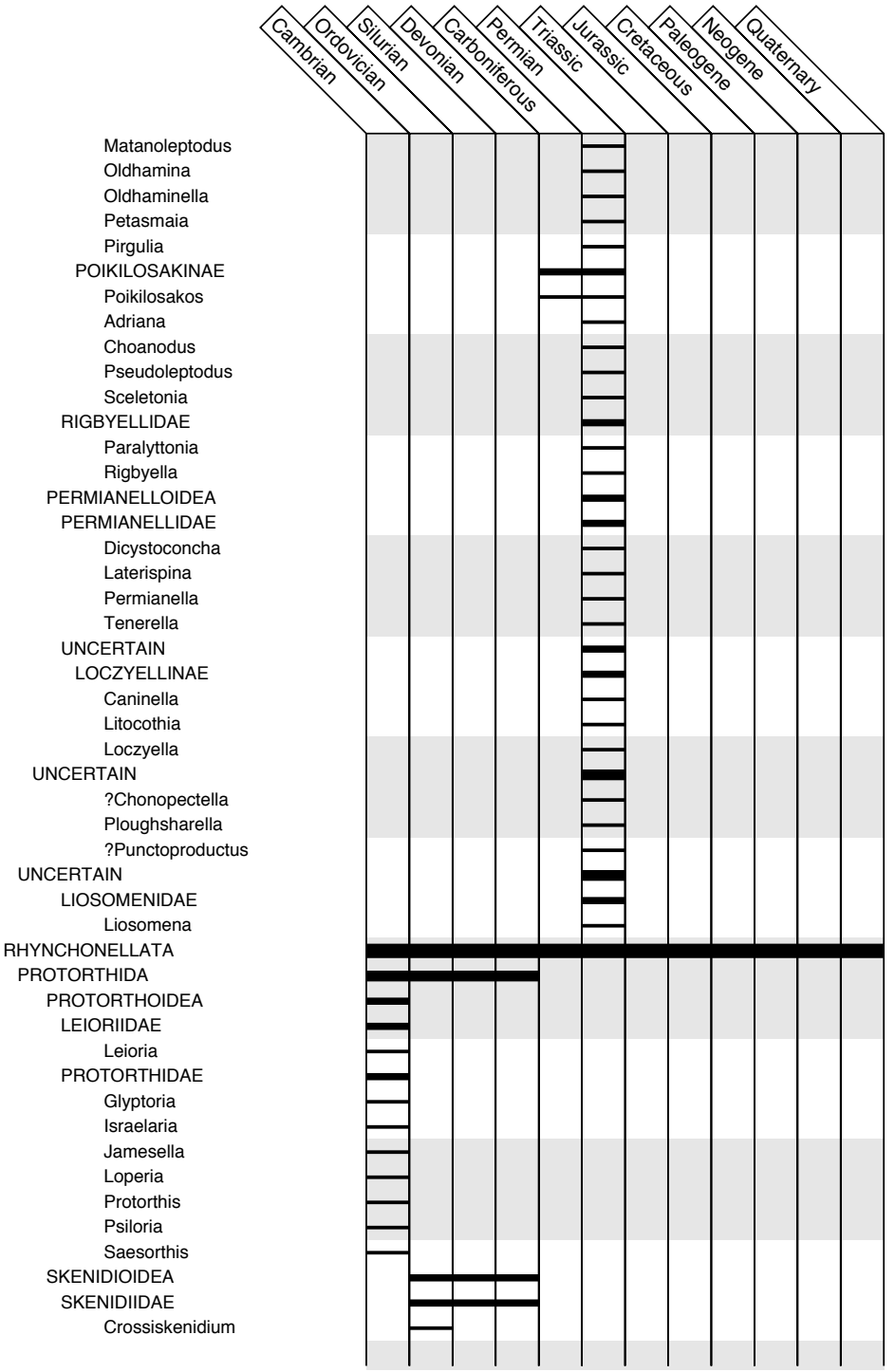

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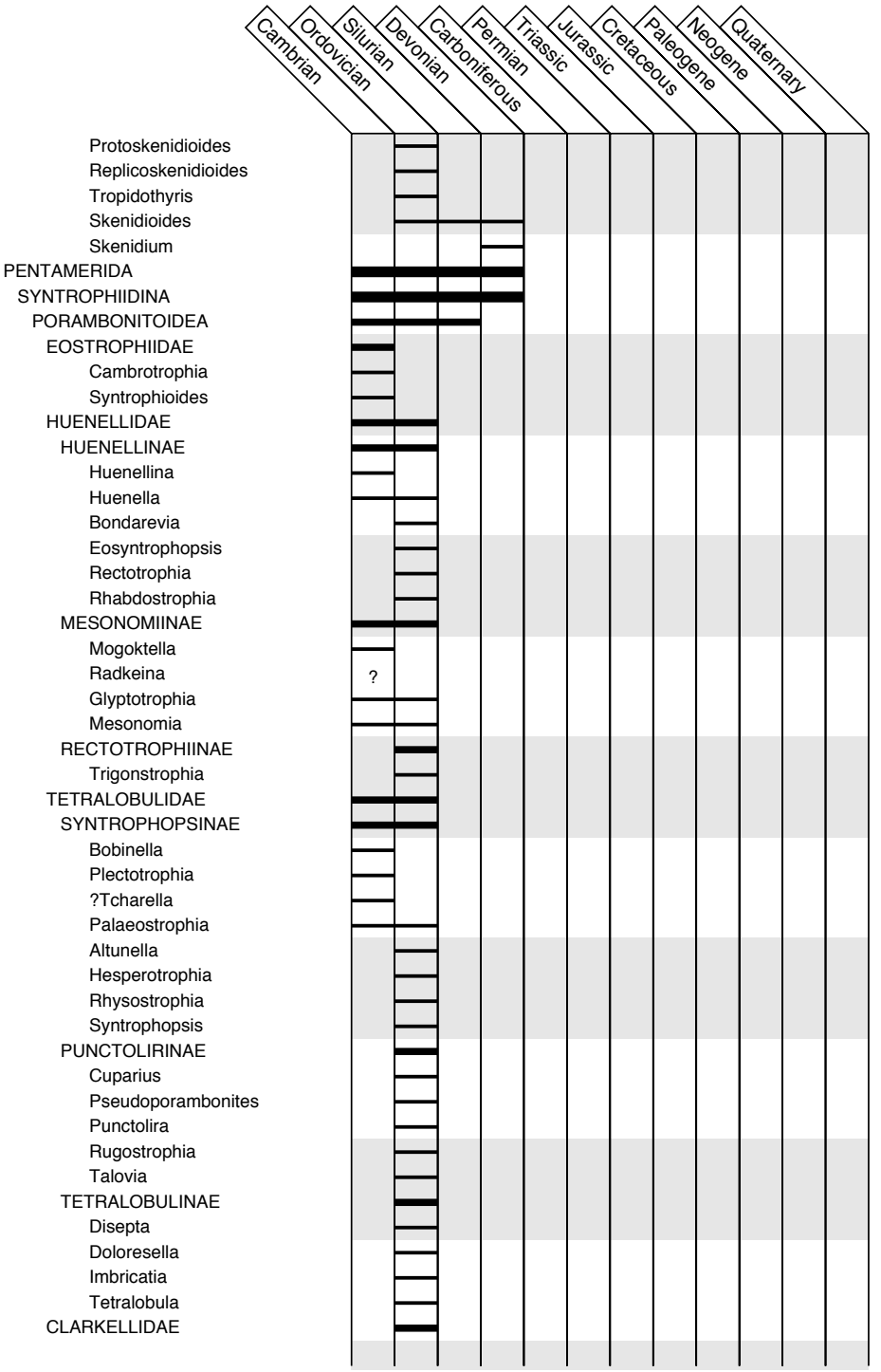

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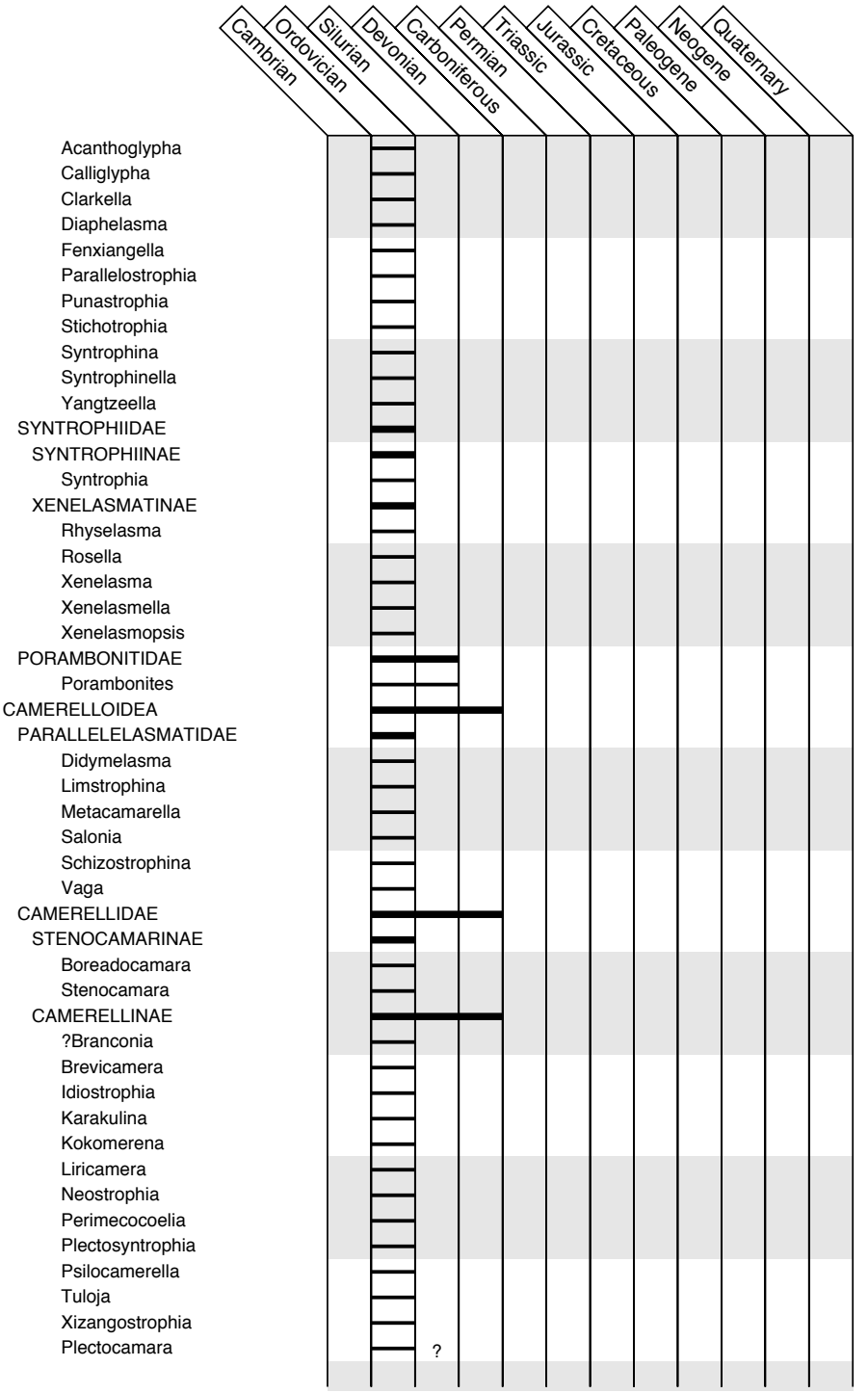
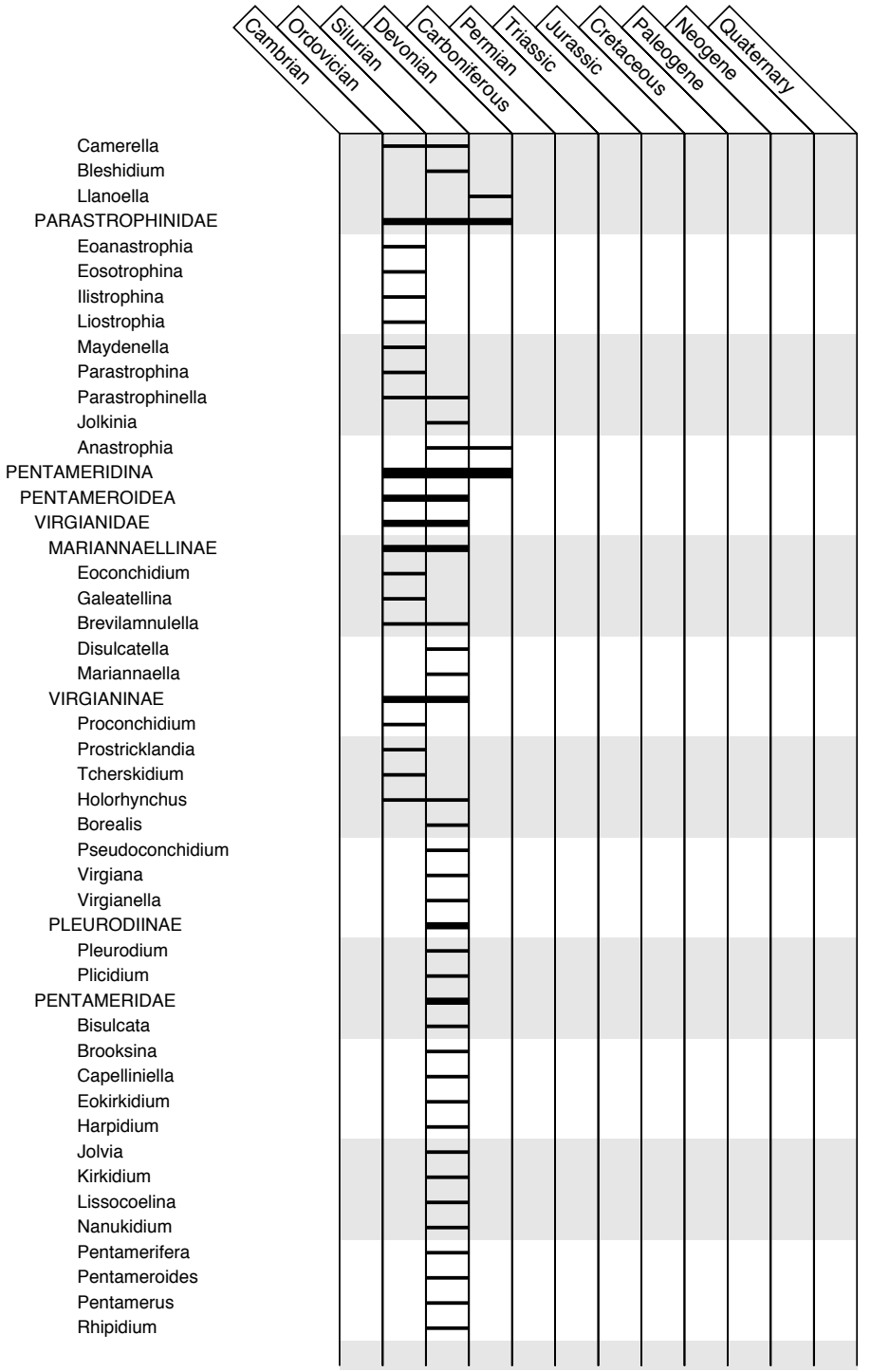


TABLE 41. *(Continued).*



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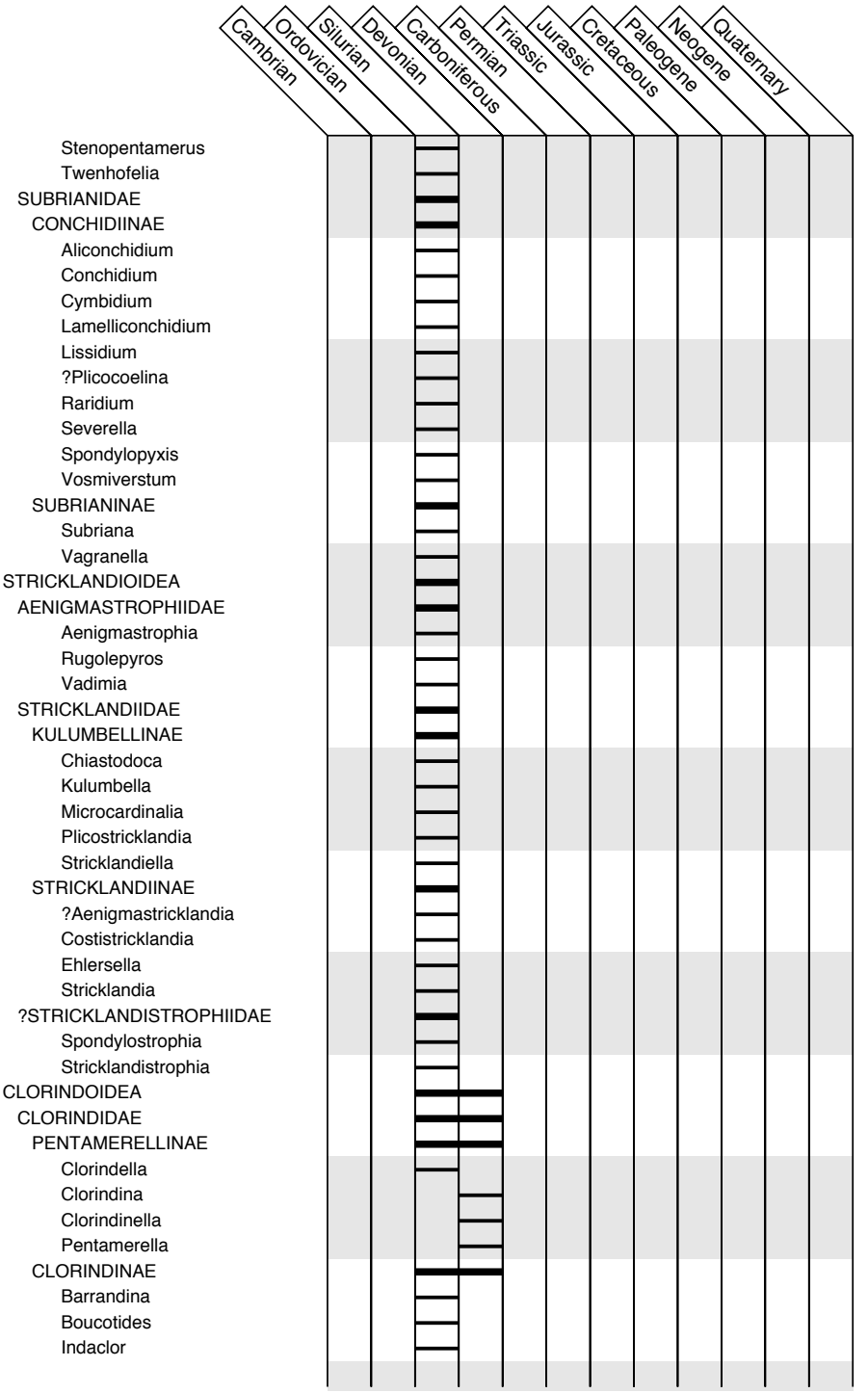

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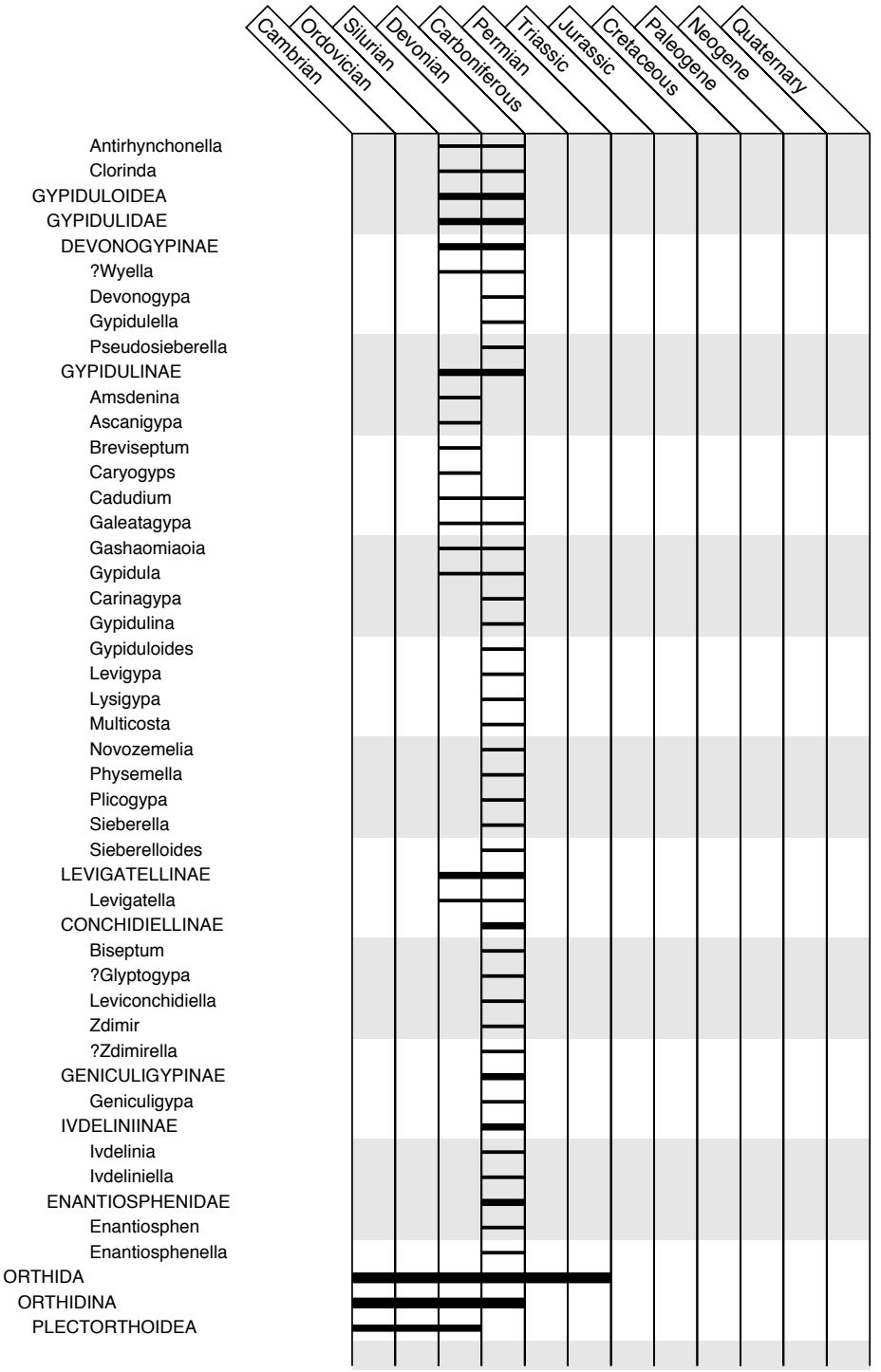

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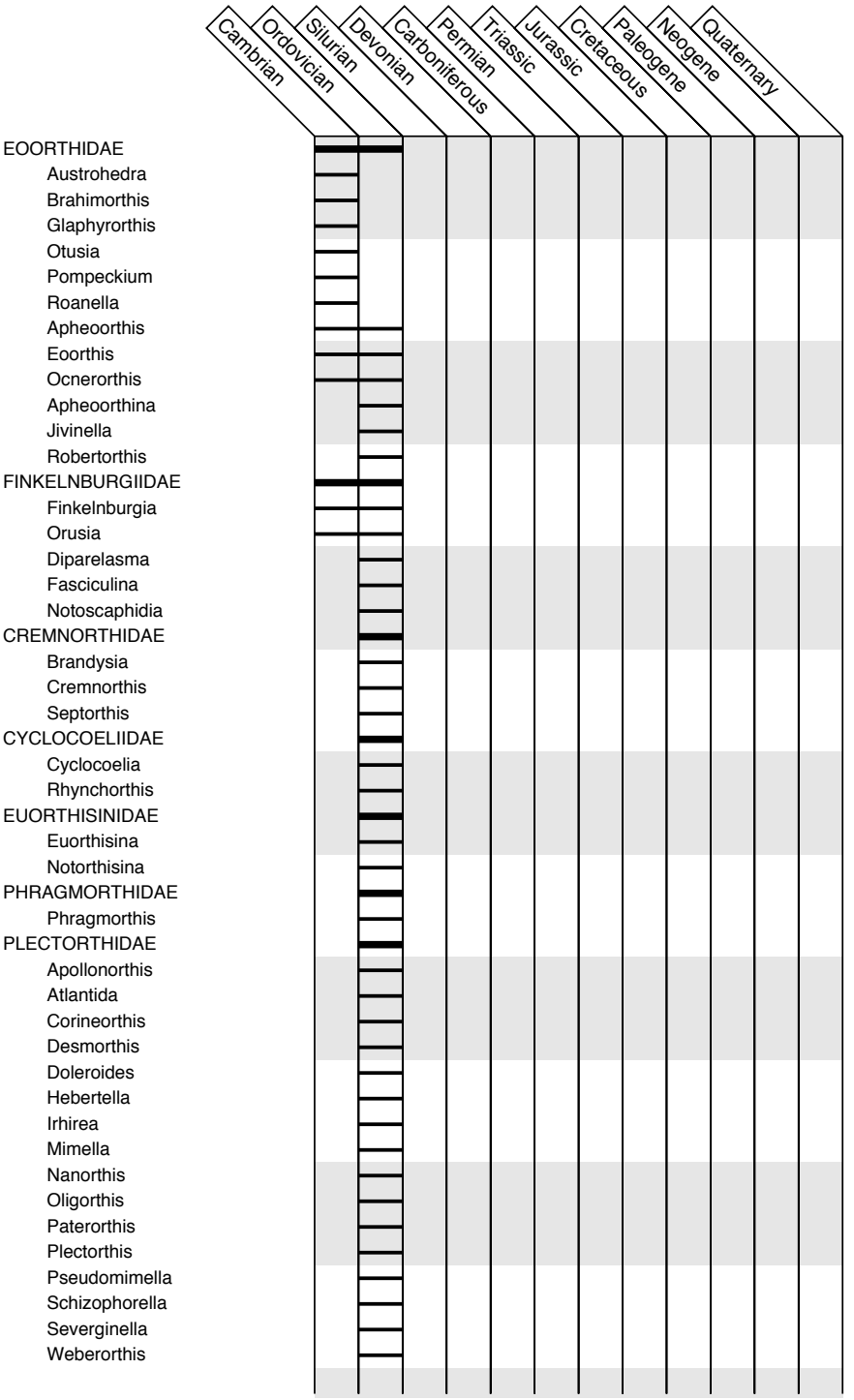

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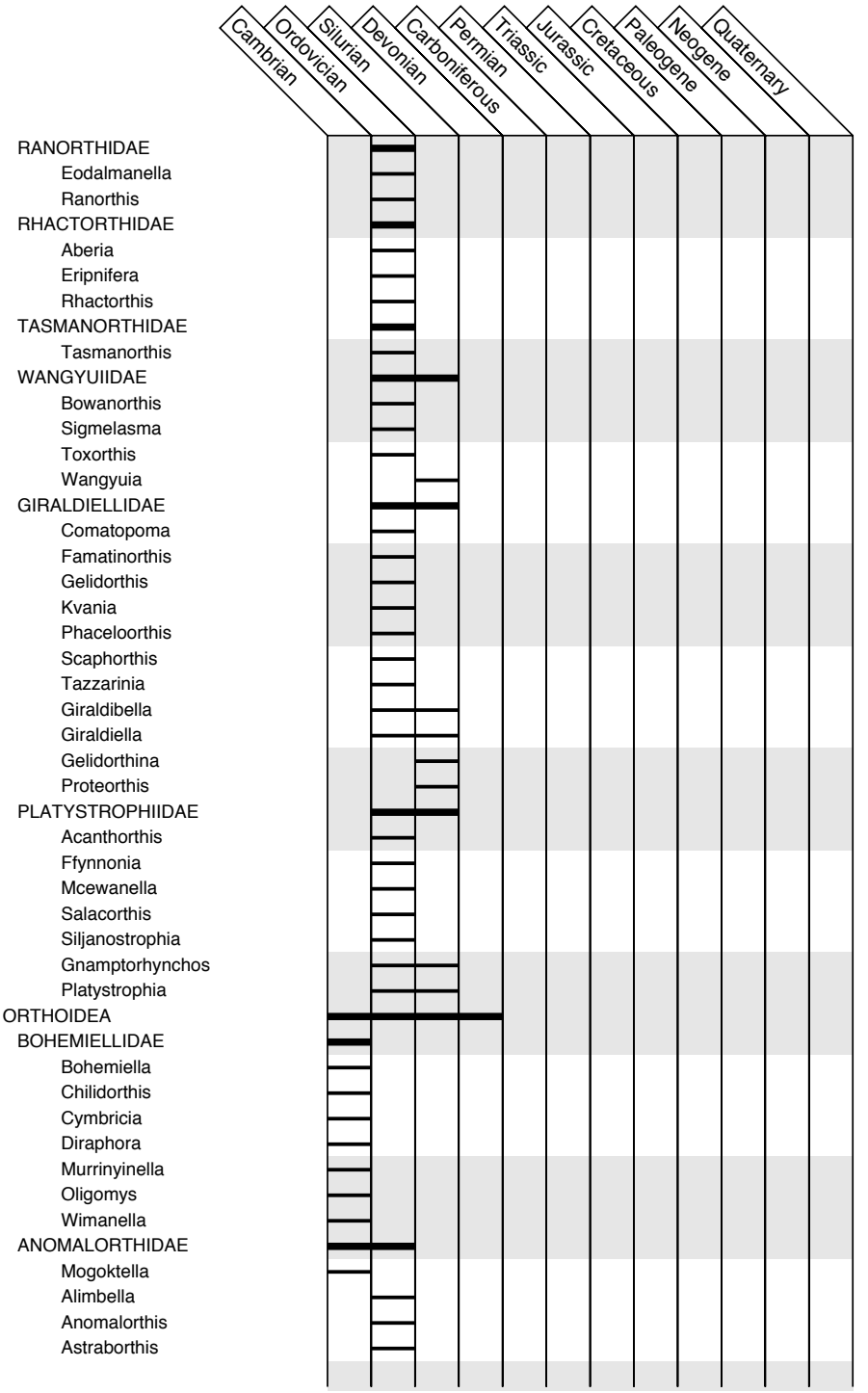

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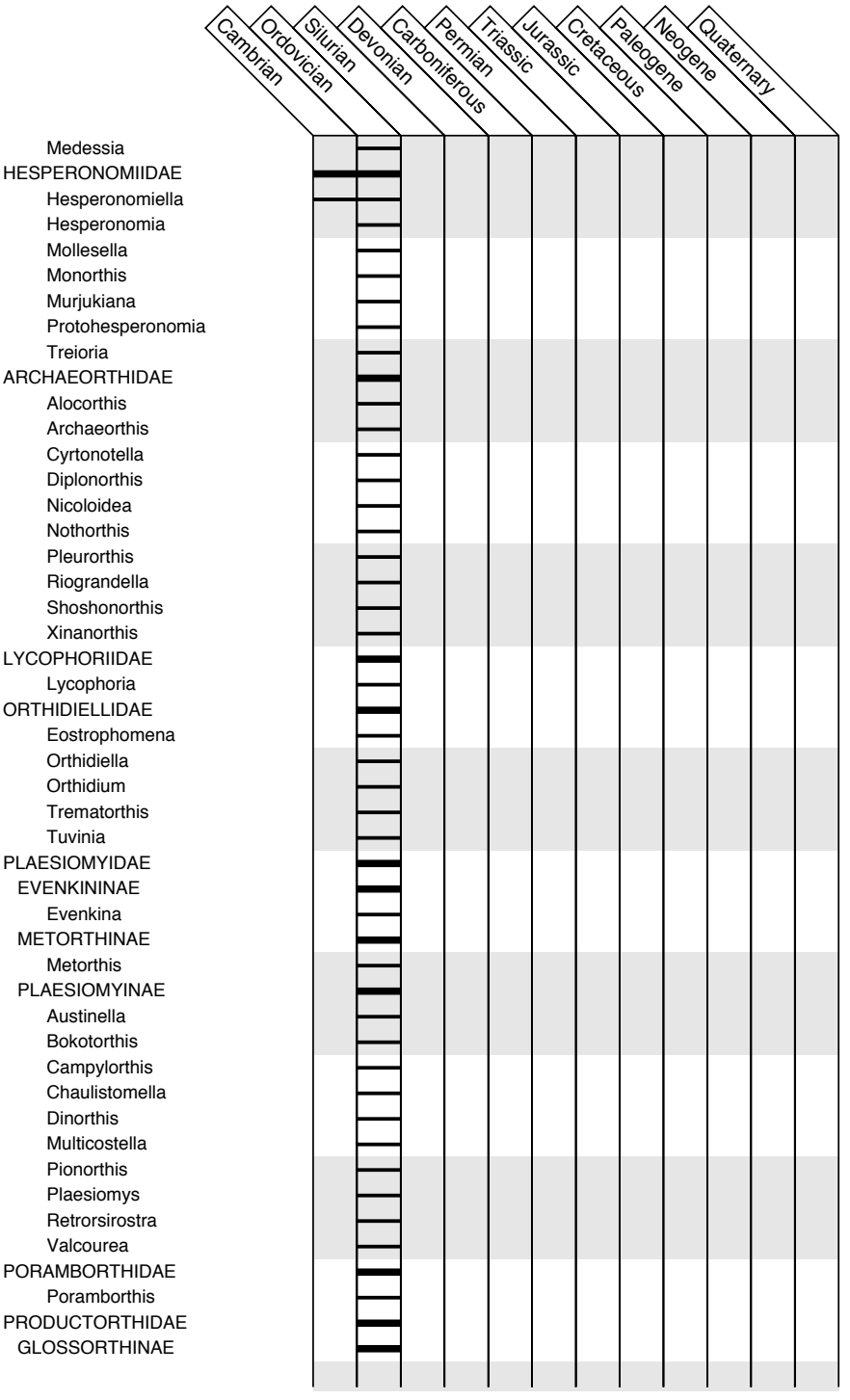

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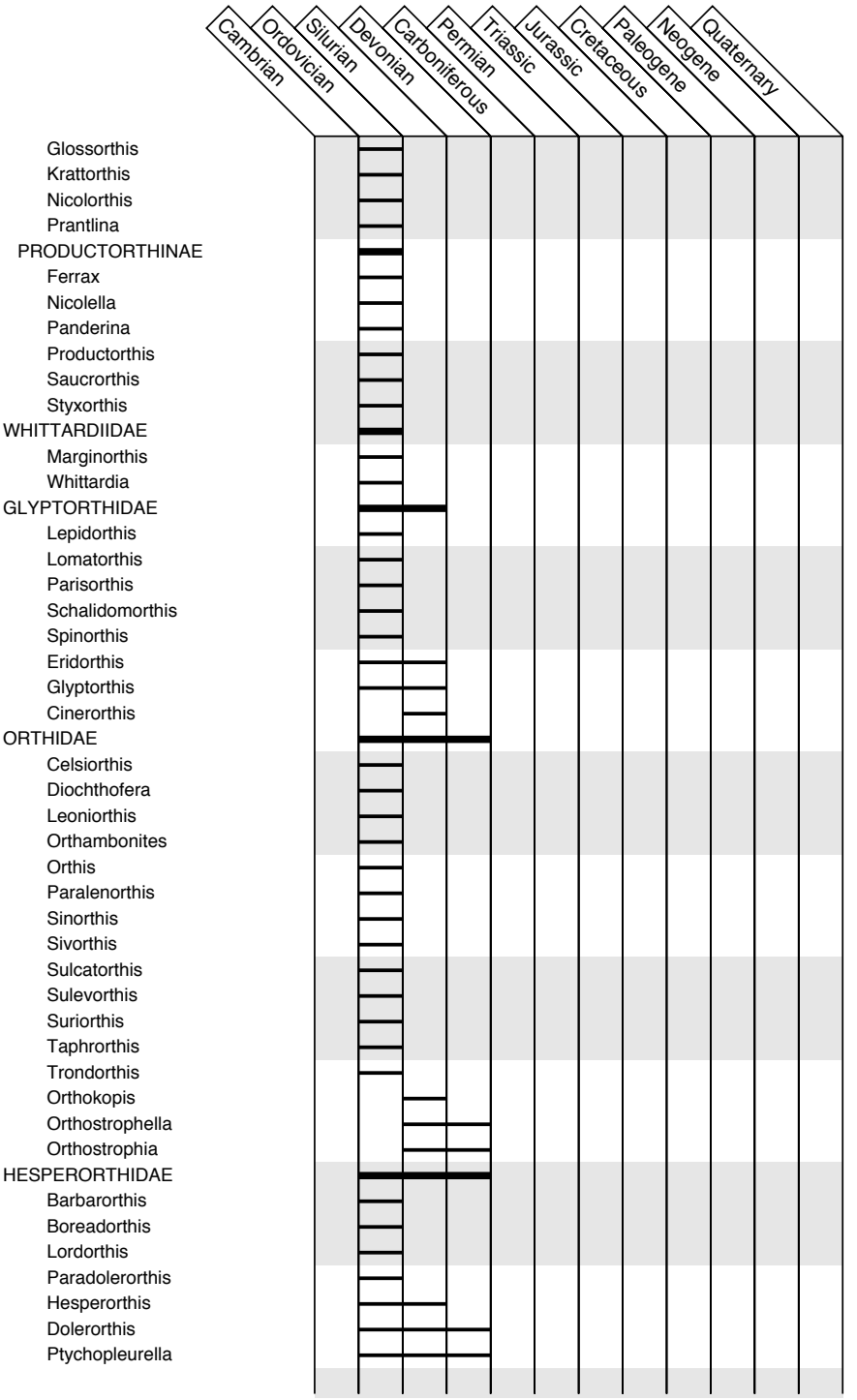

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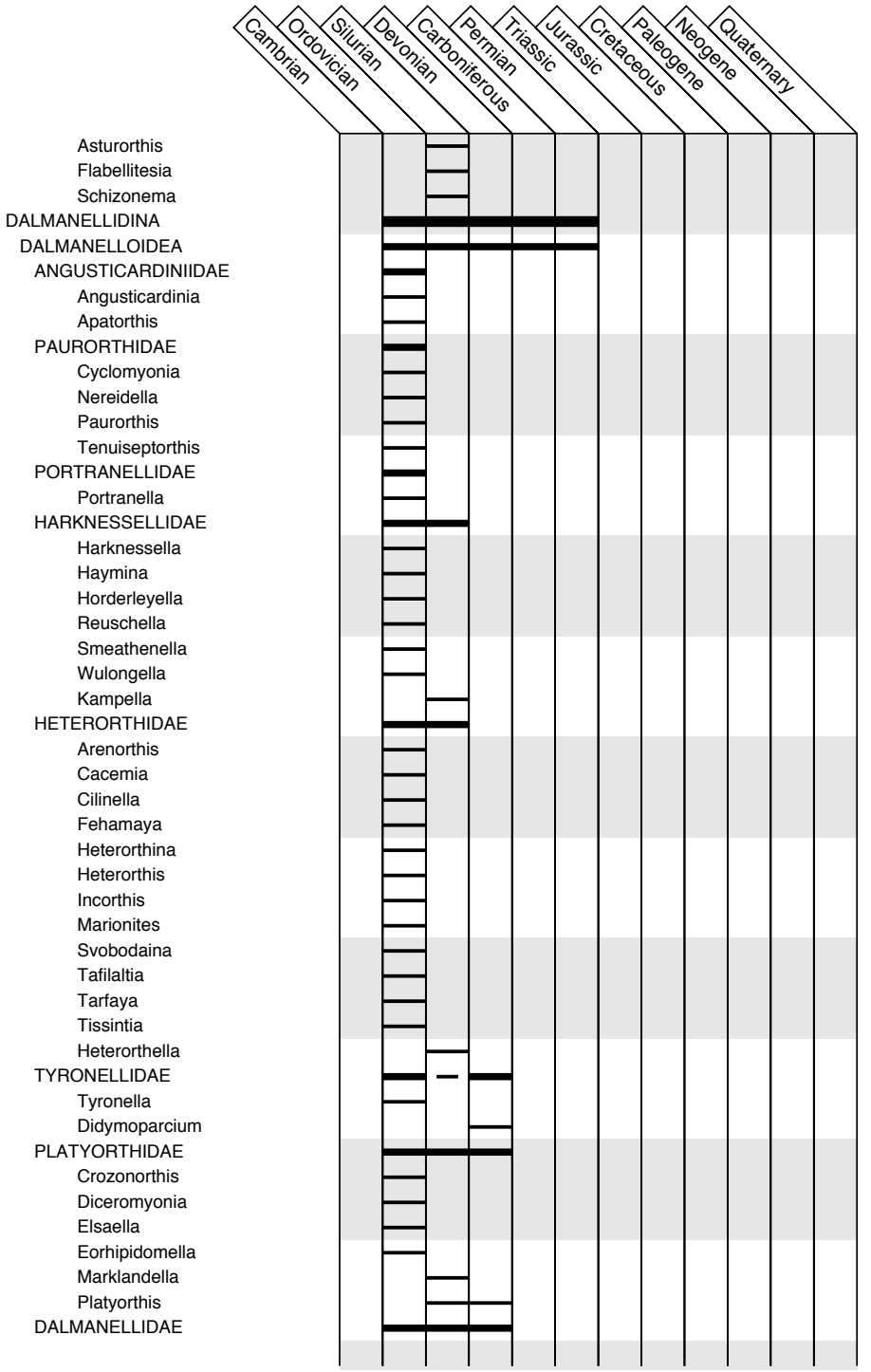

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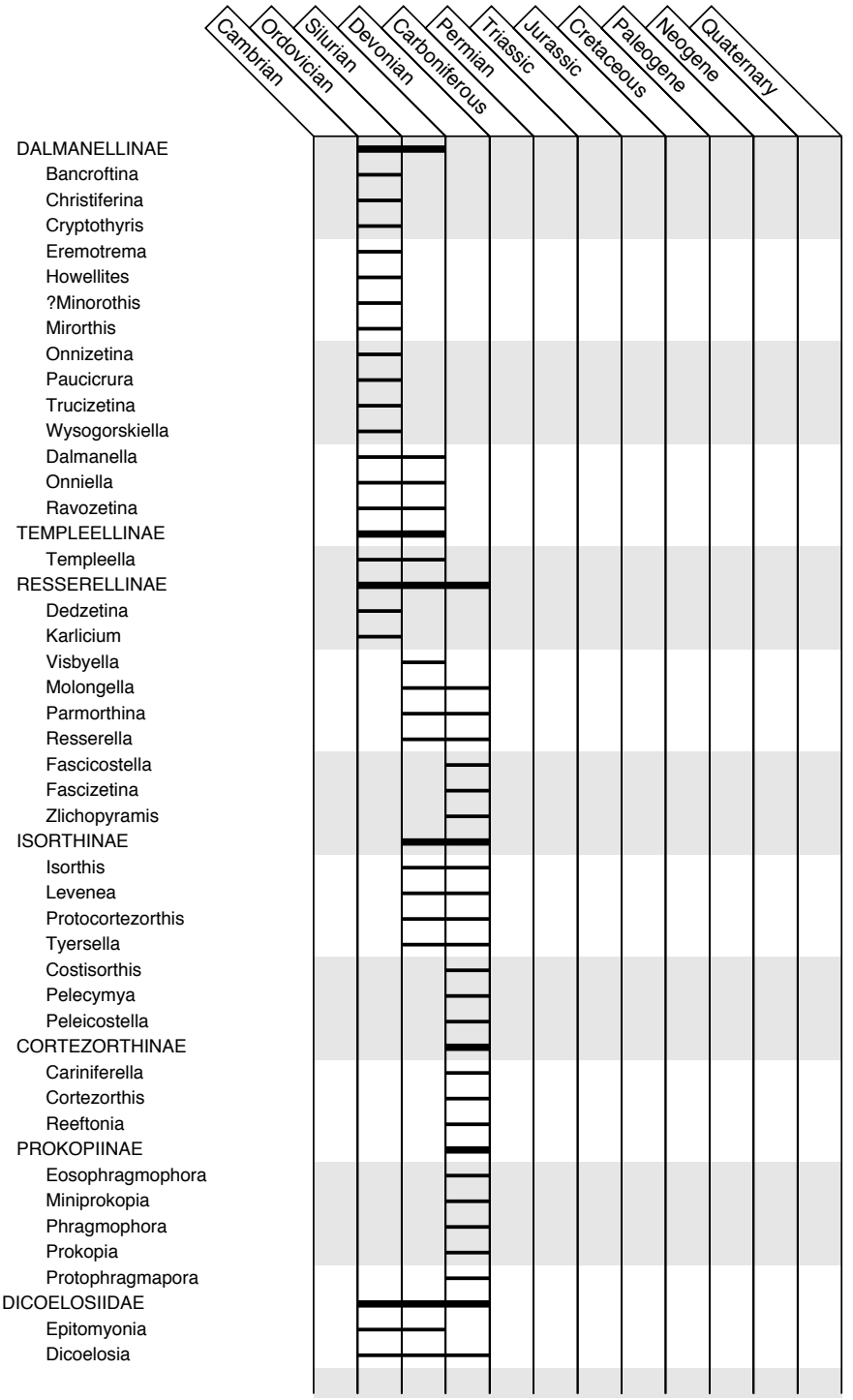

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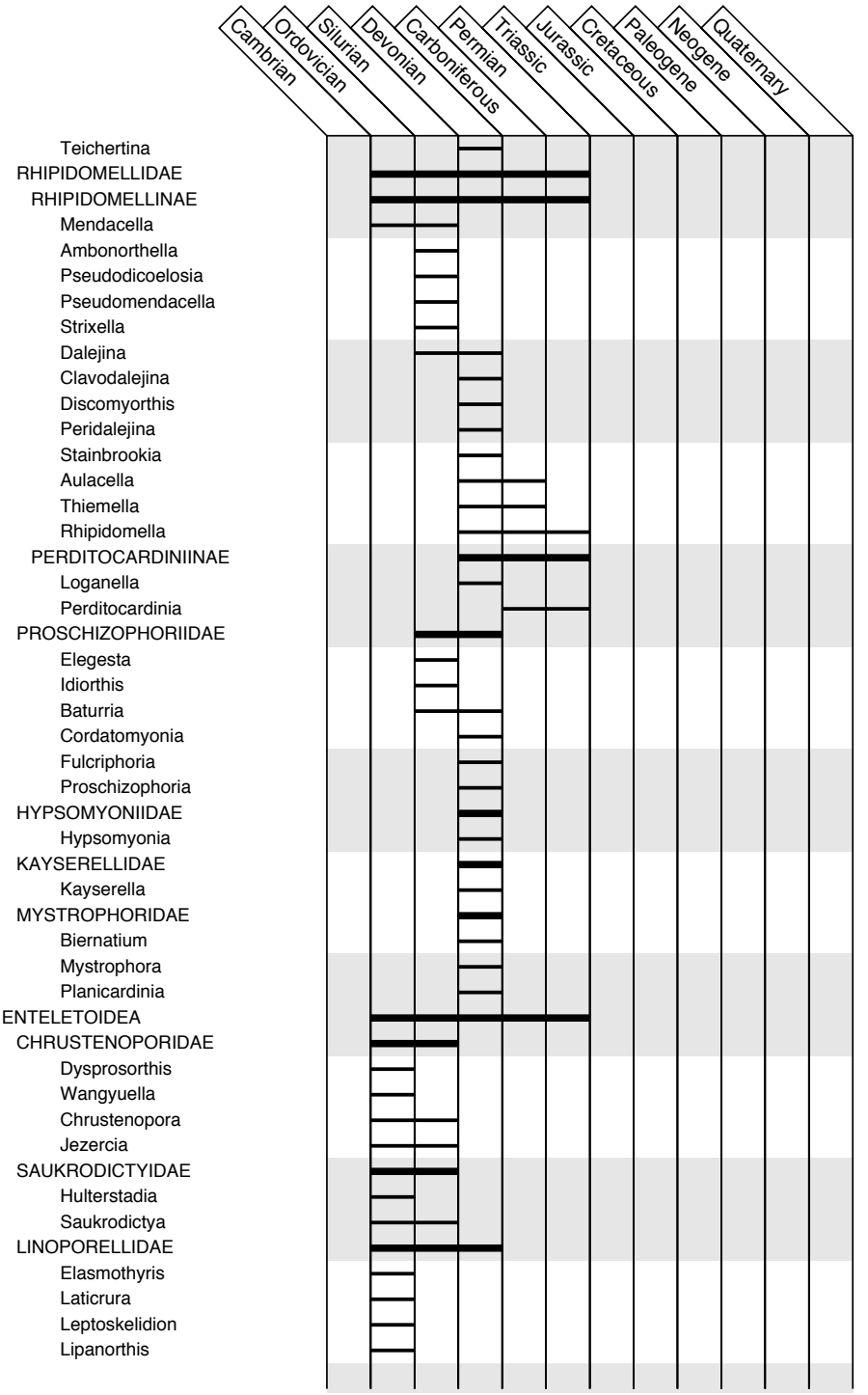


TABLE 41. *(Continued).*

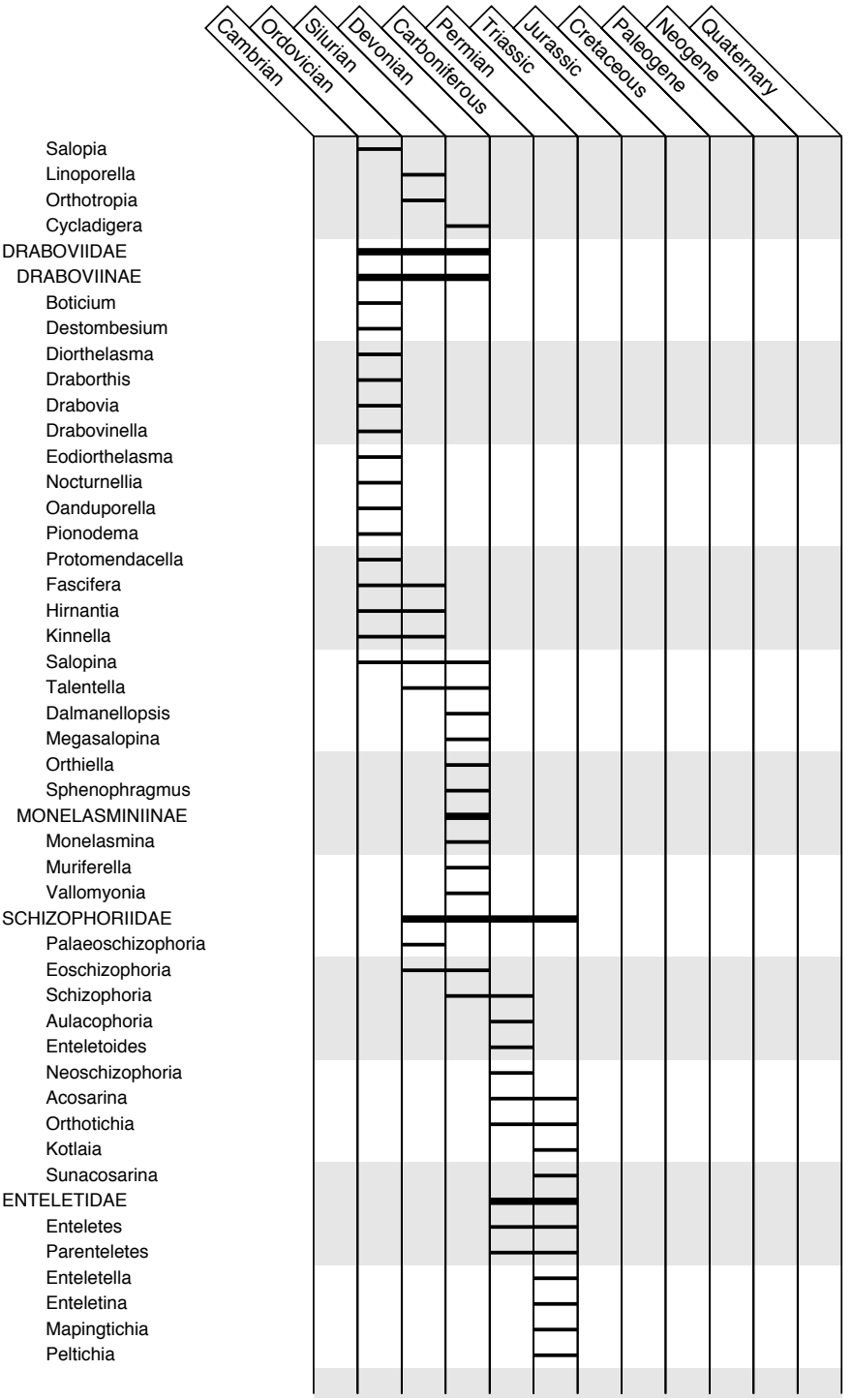
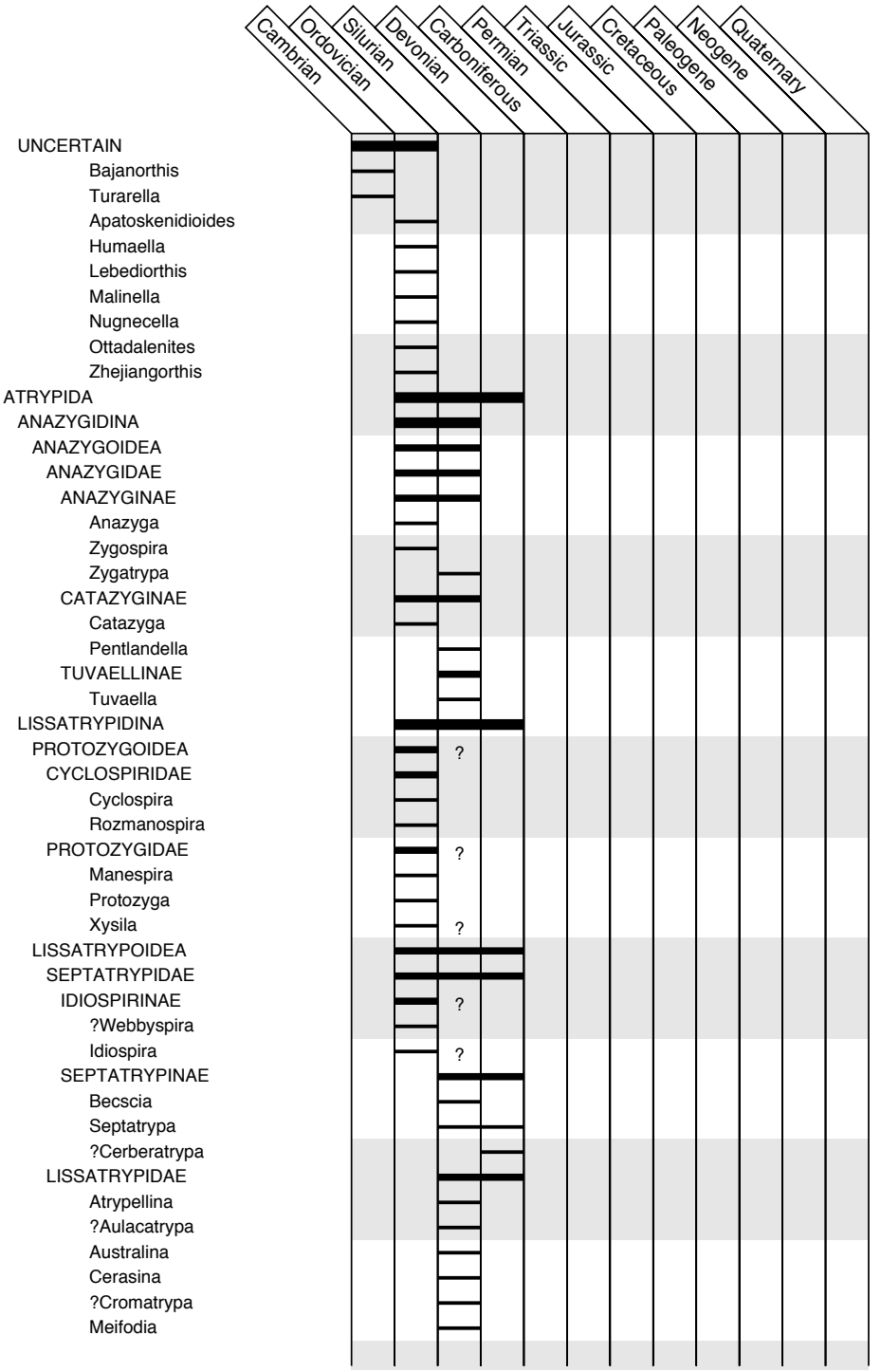


TABLE 41. *(Continued).*



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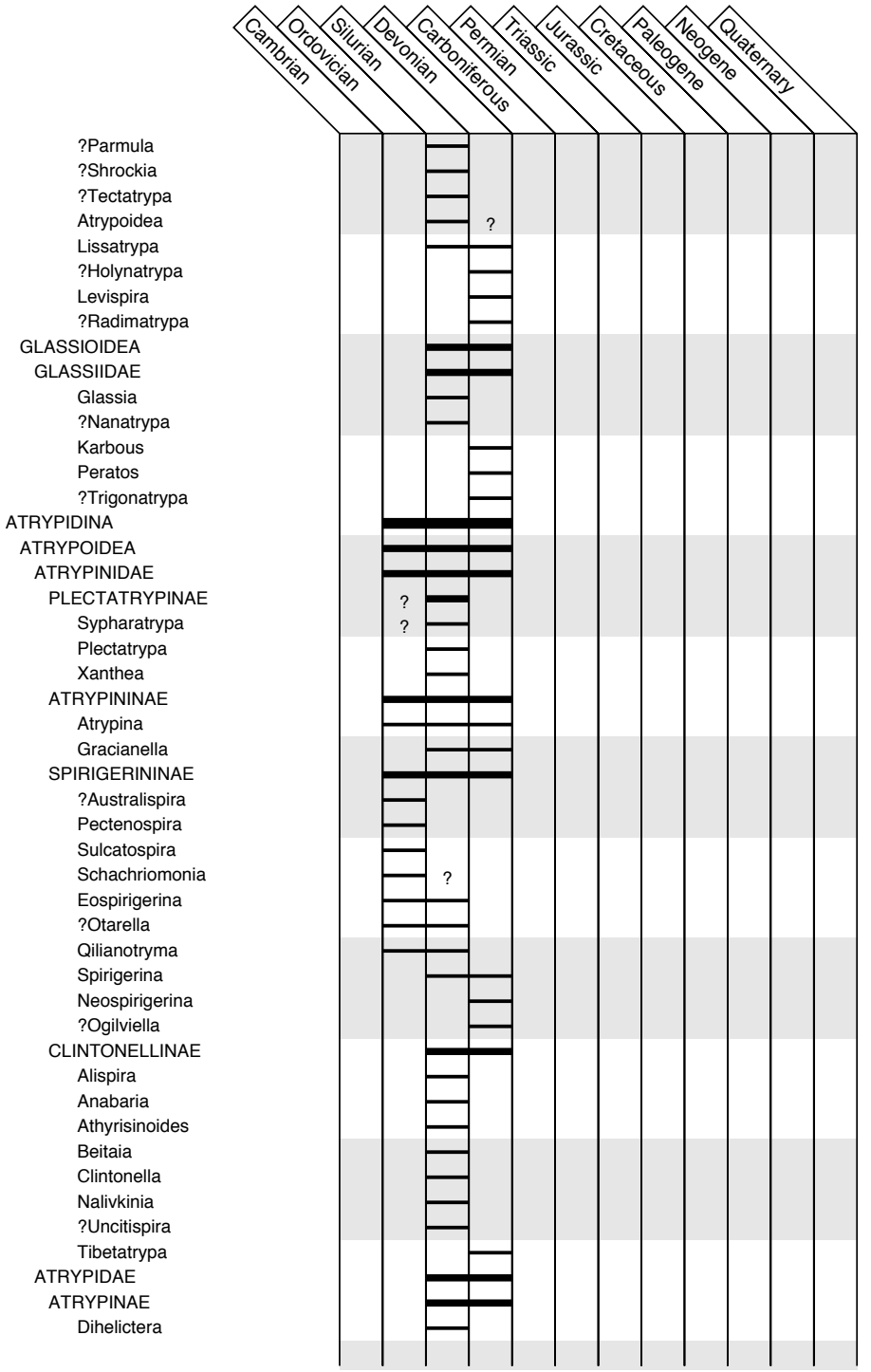

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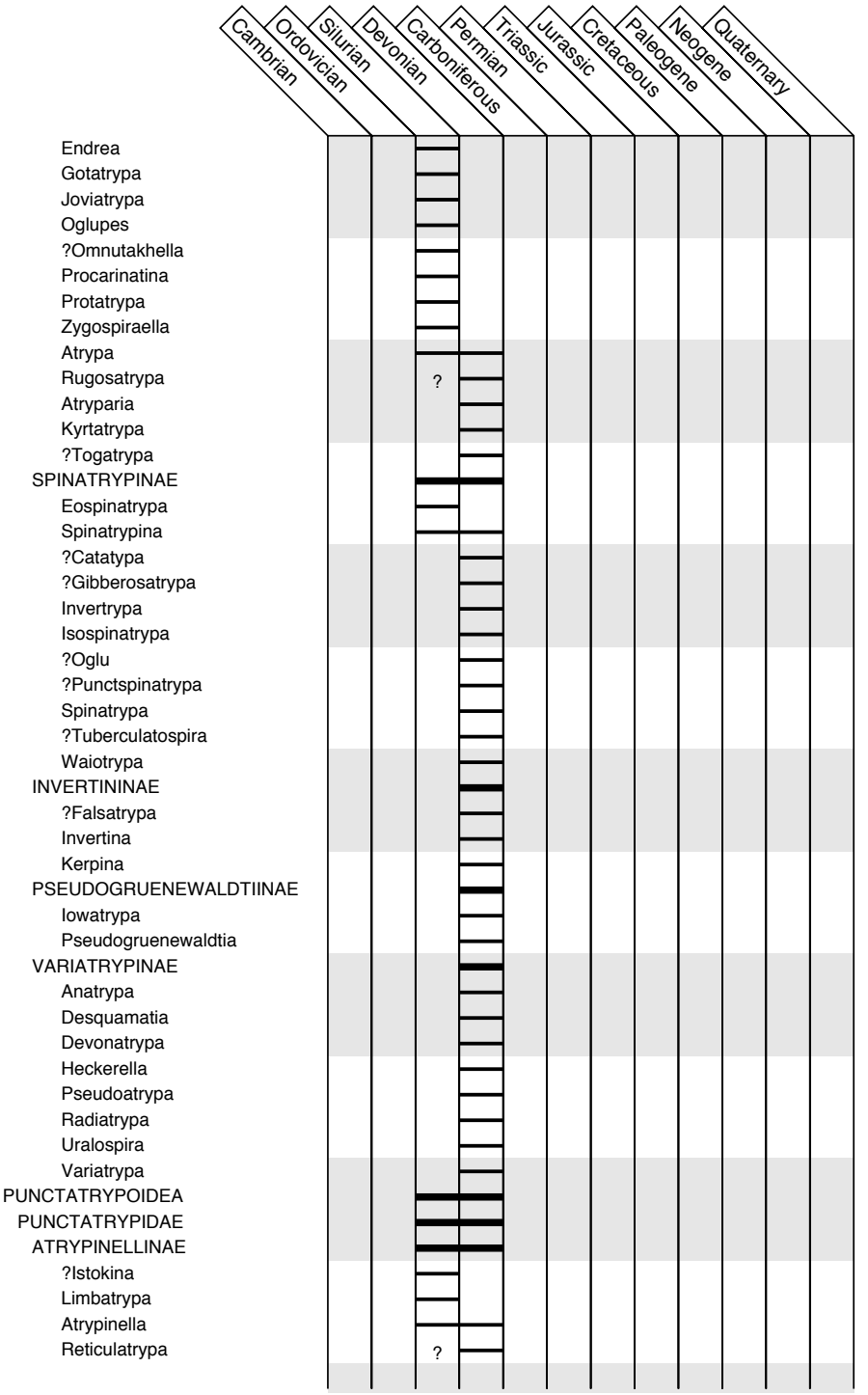

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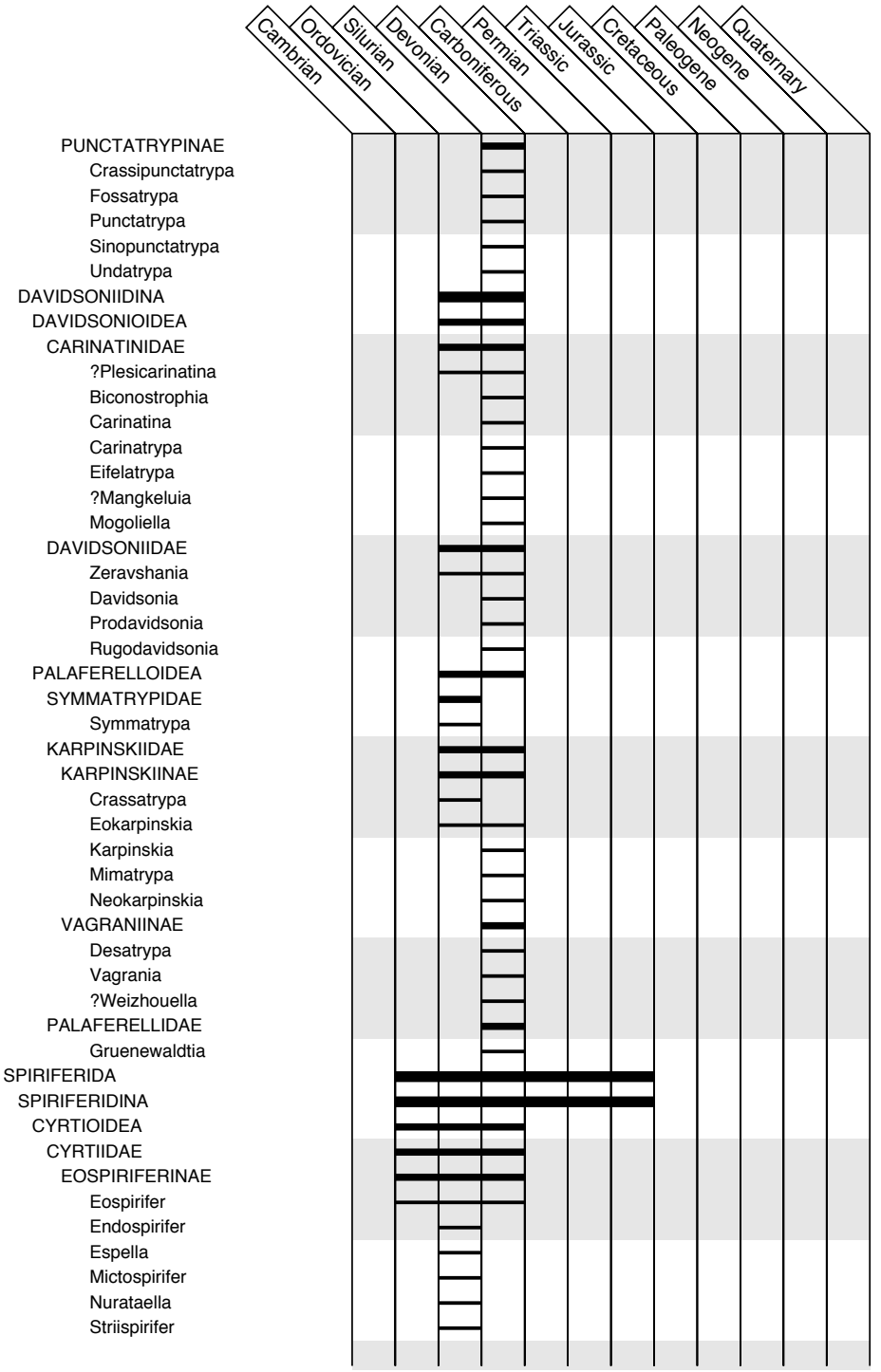

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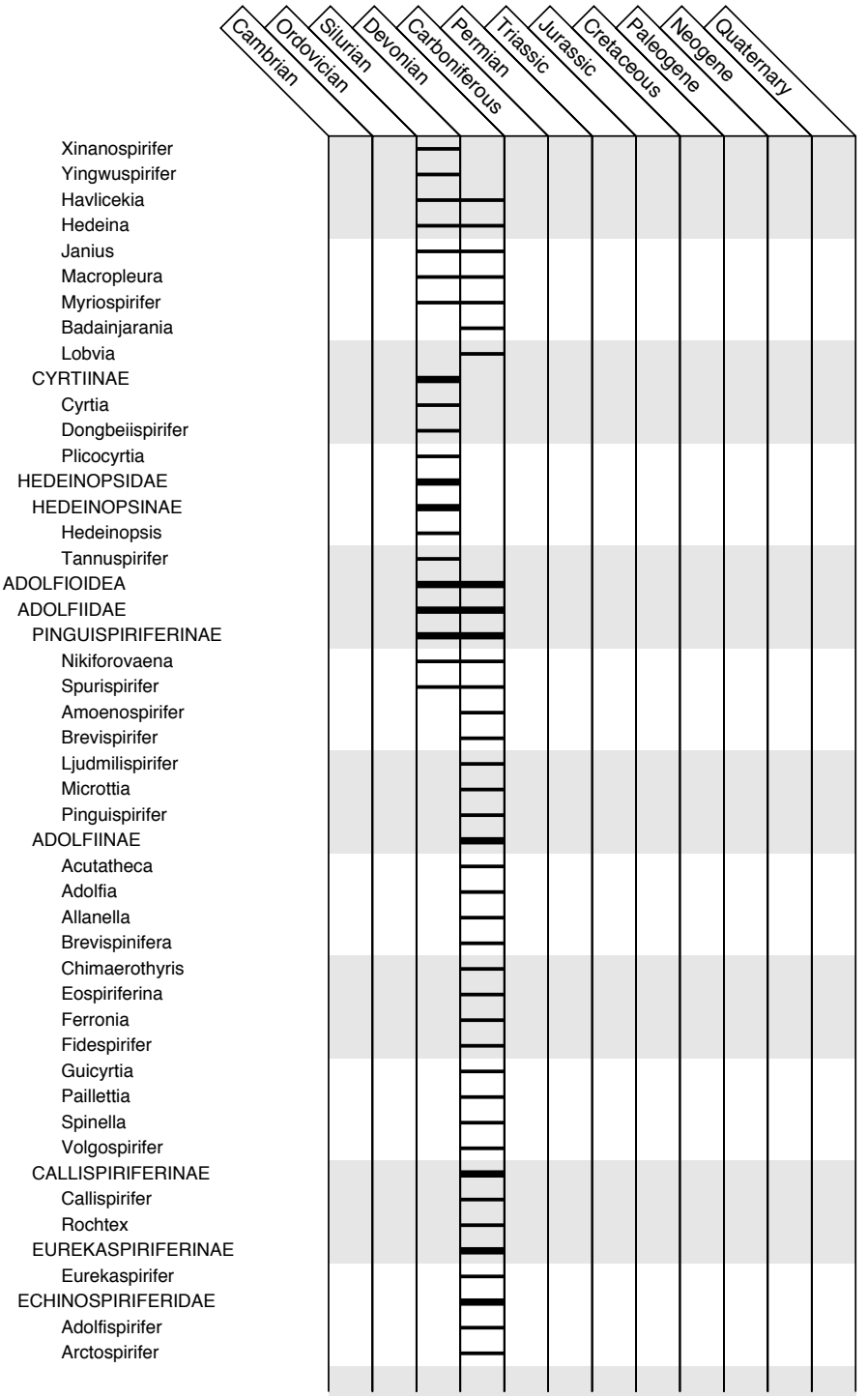
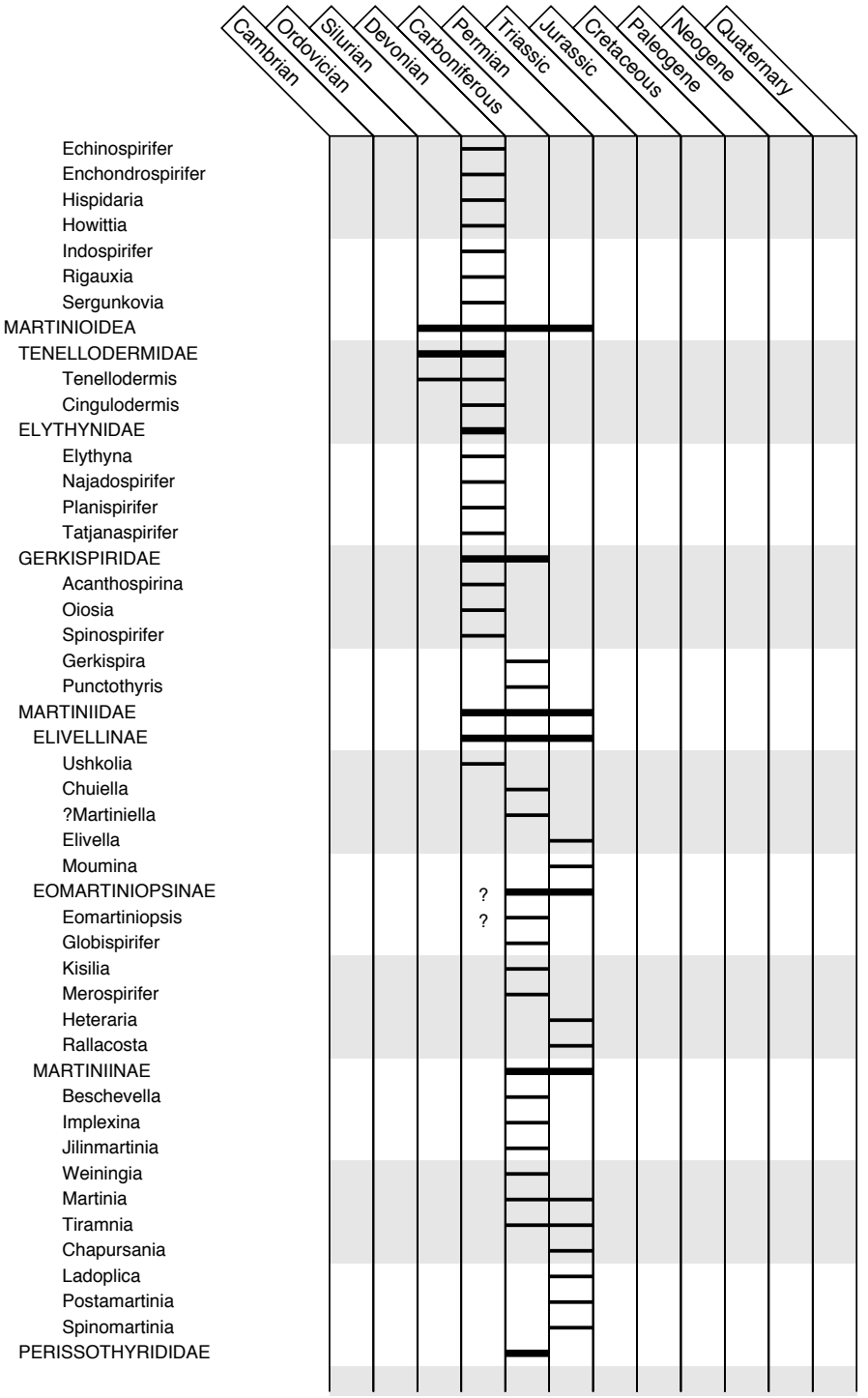


TABLE 41. *(Continued).*



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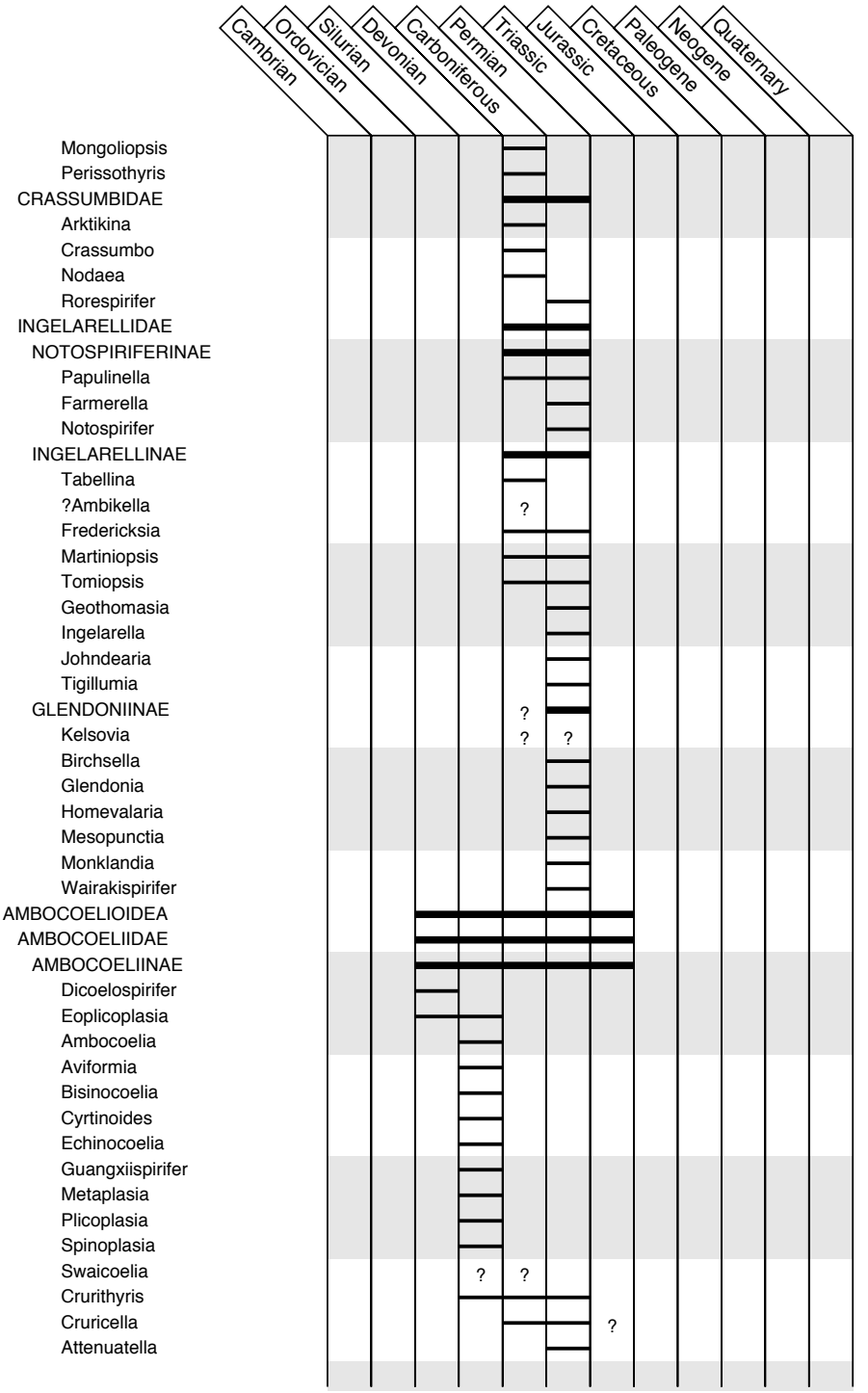

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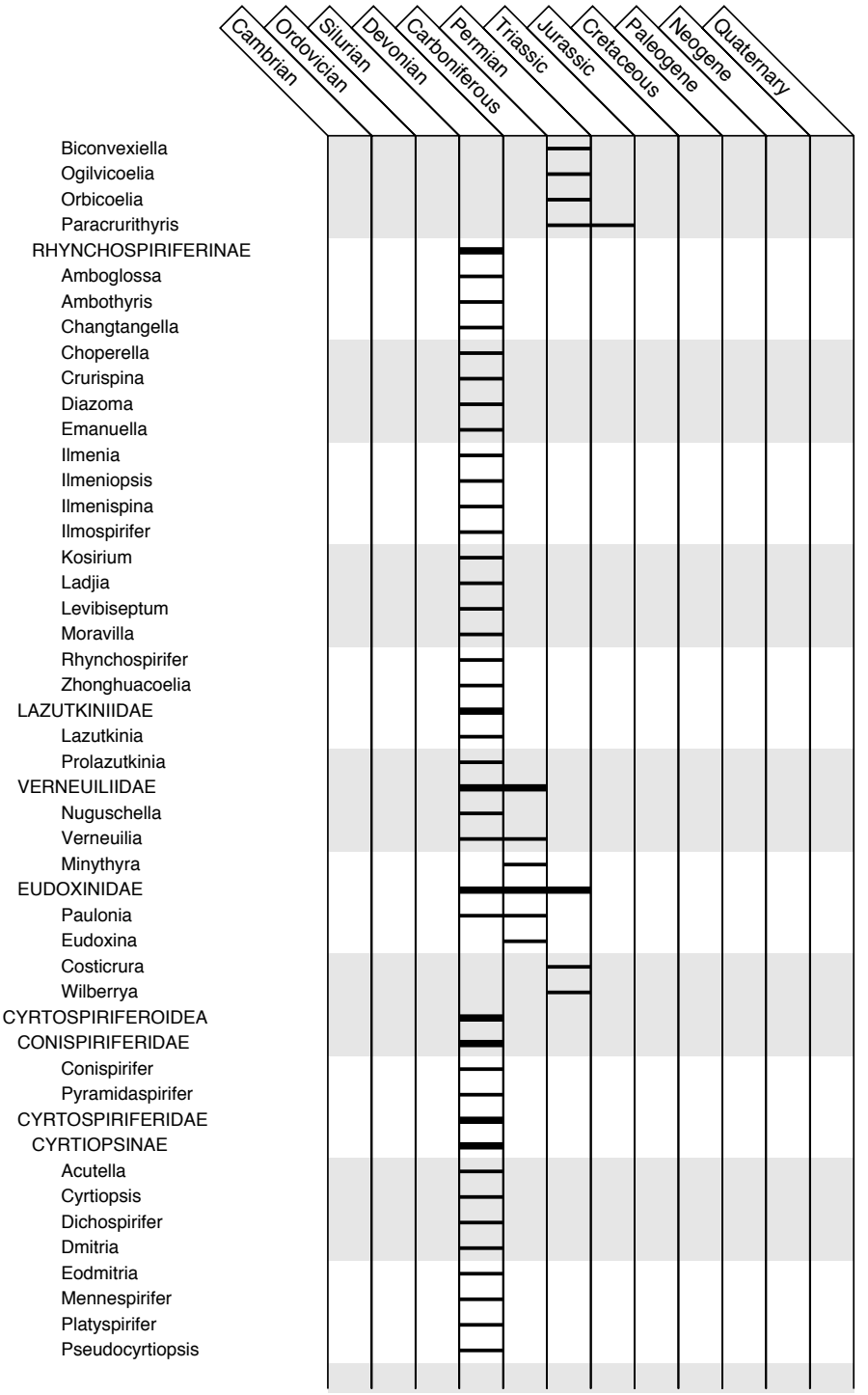

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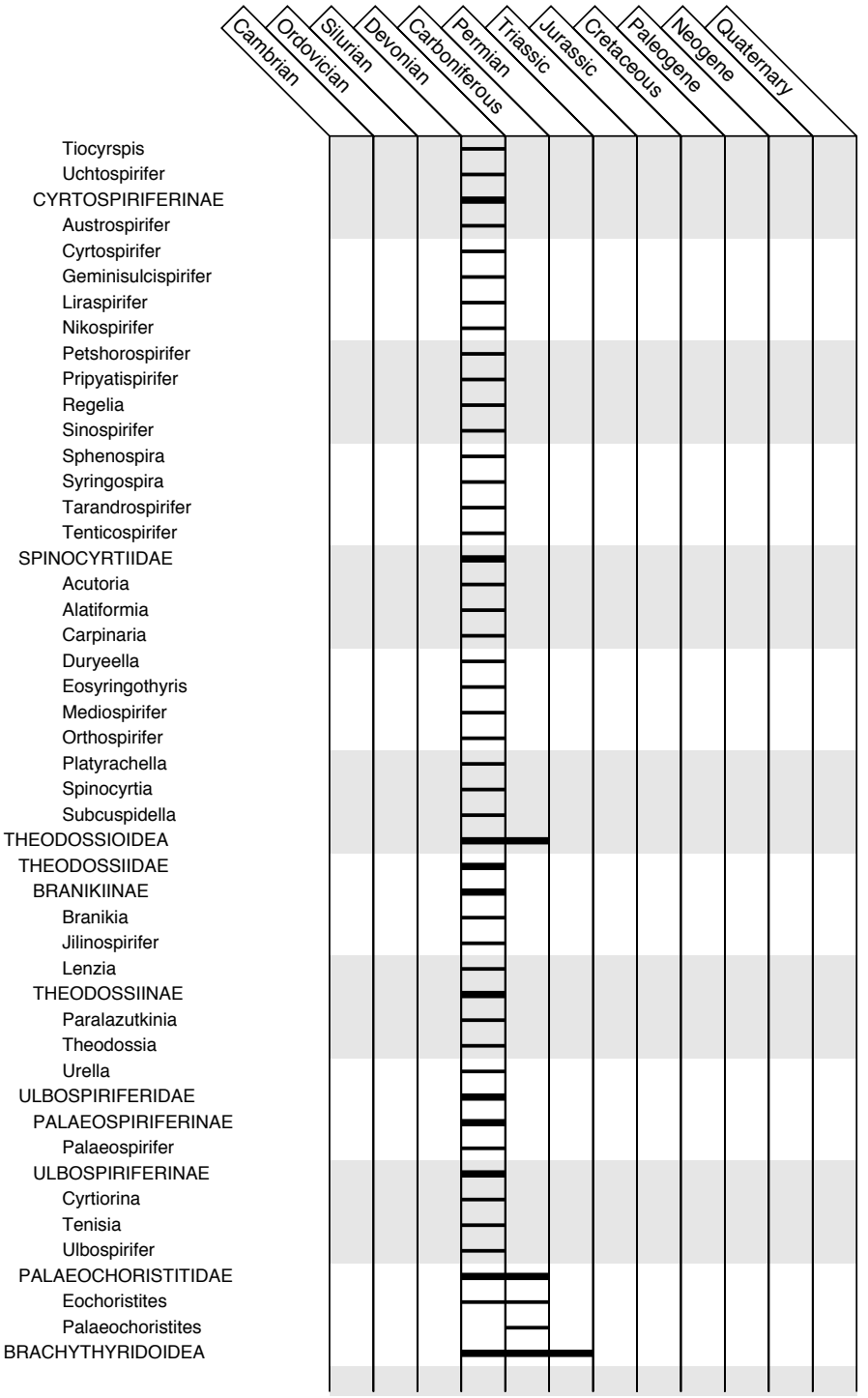

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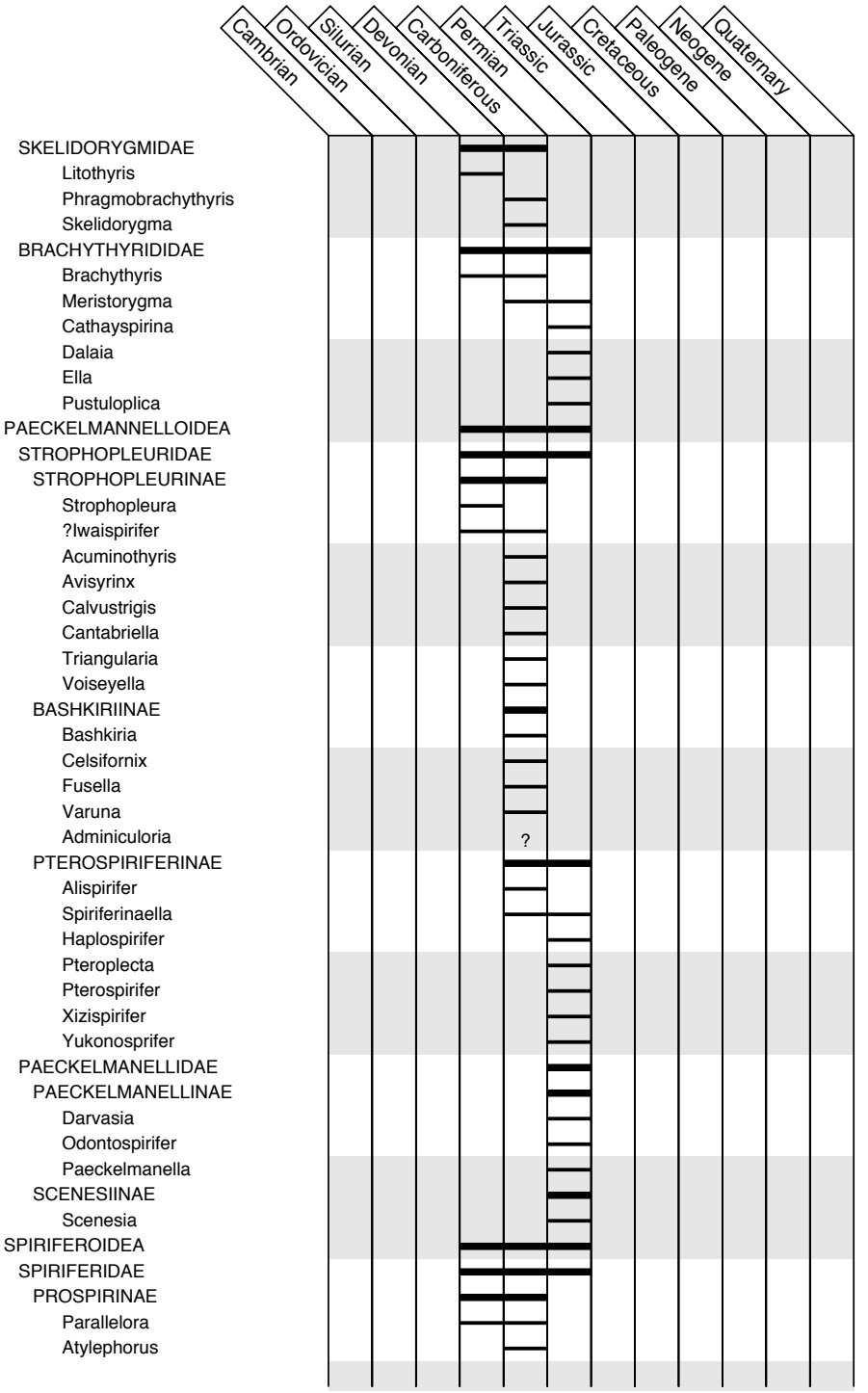

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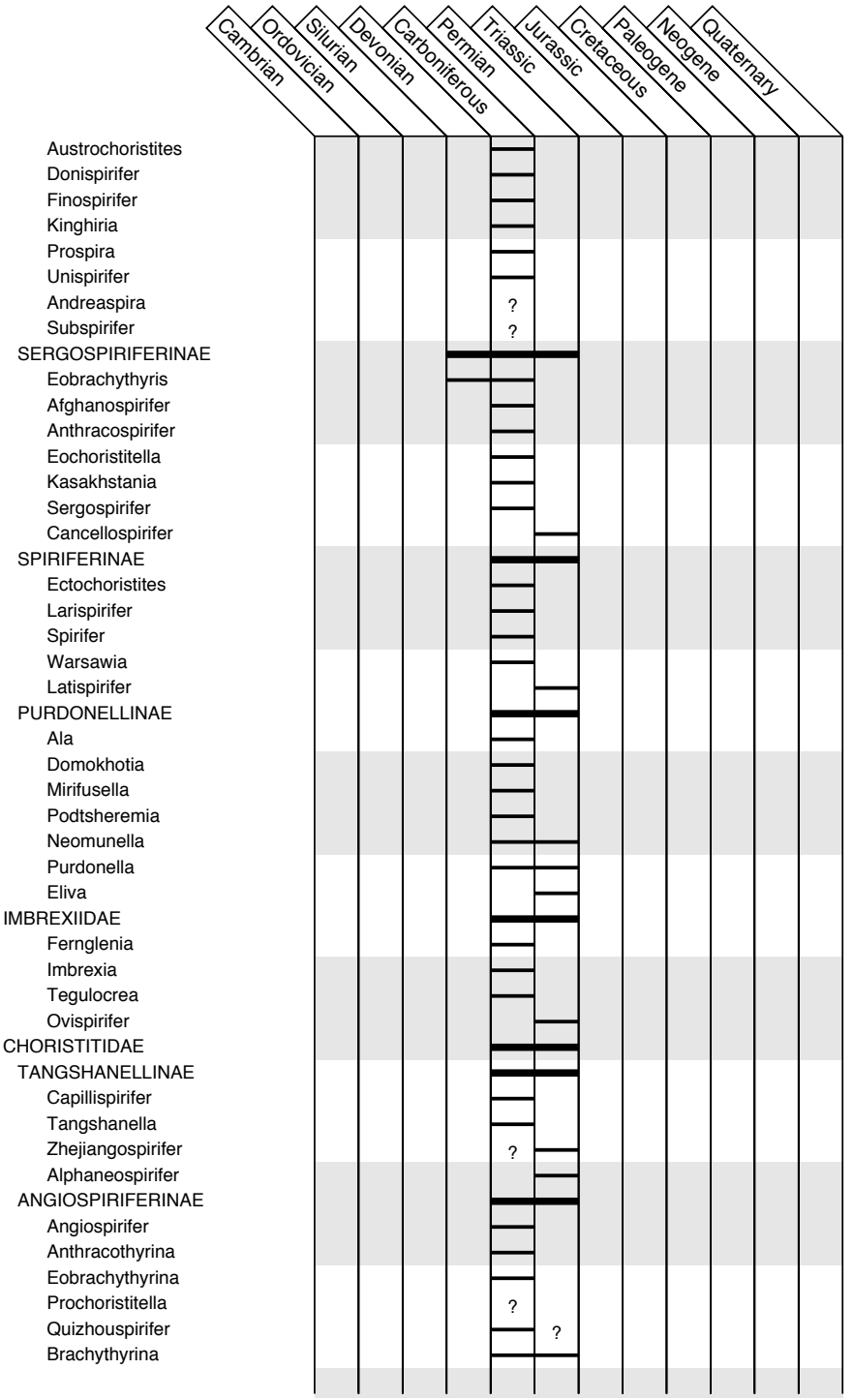

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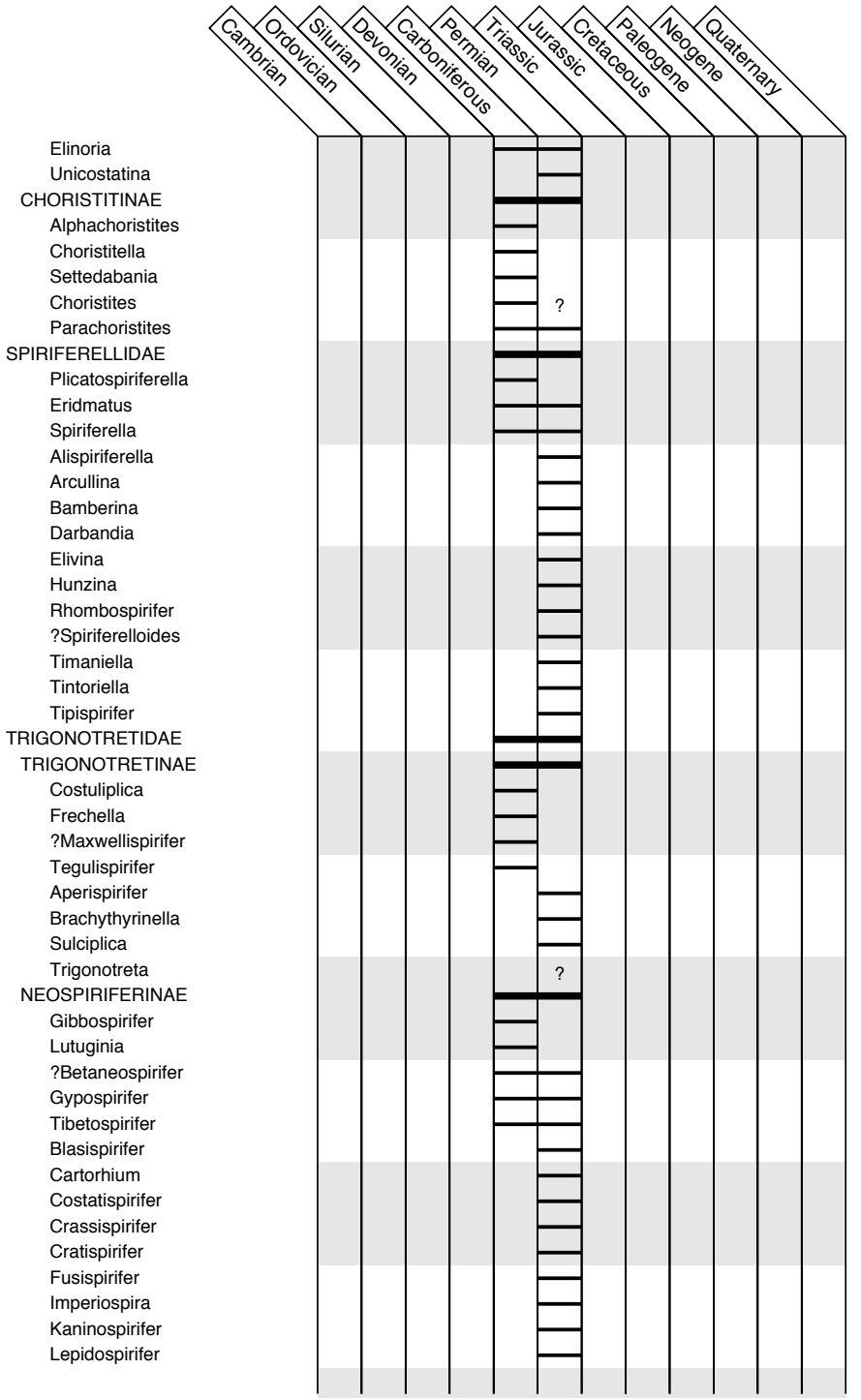

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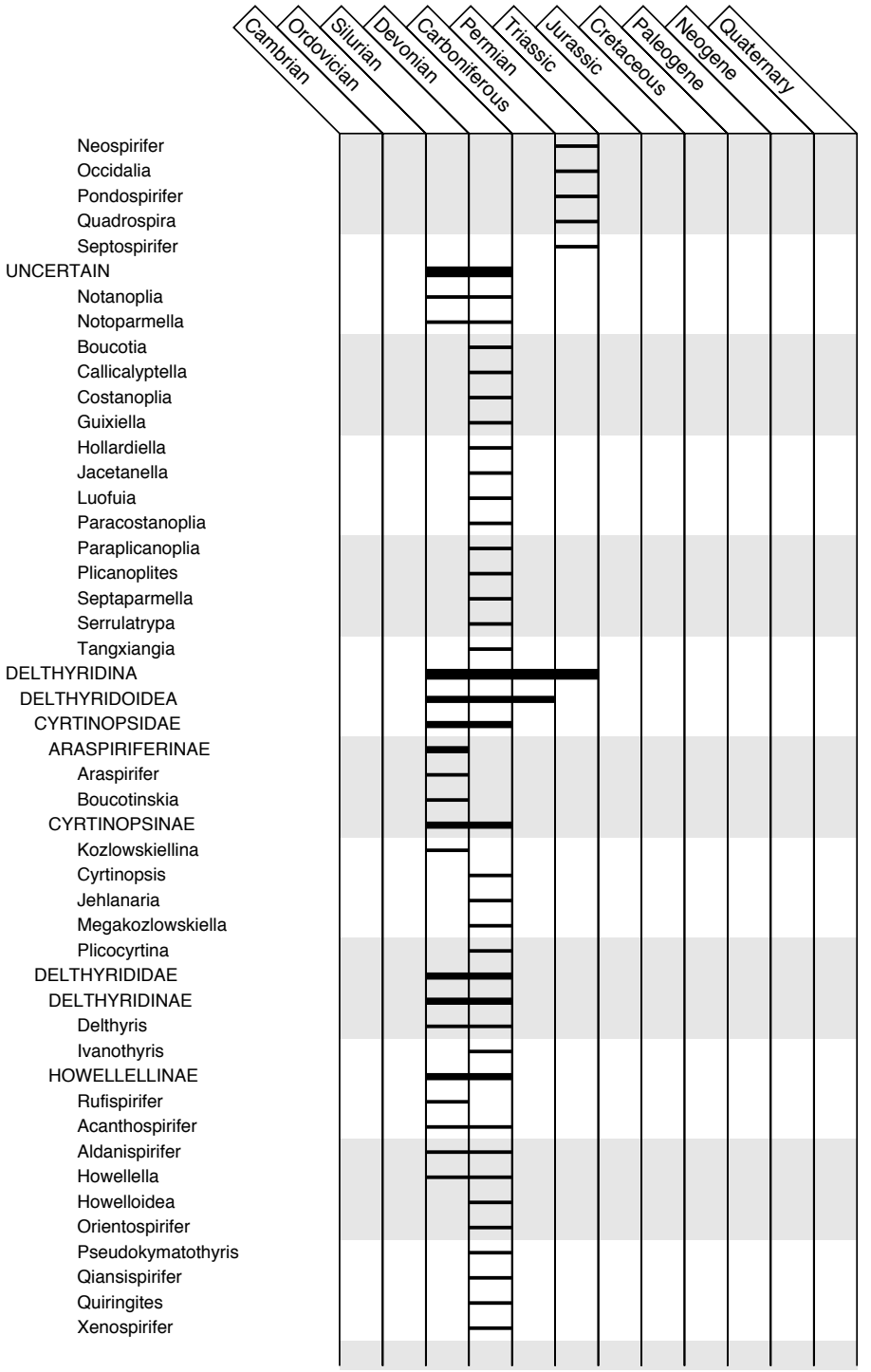

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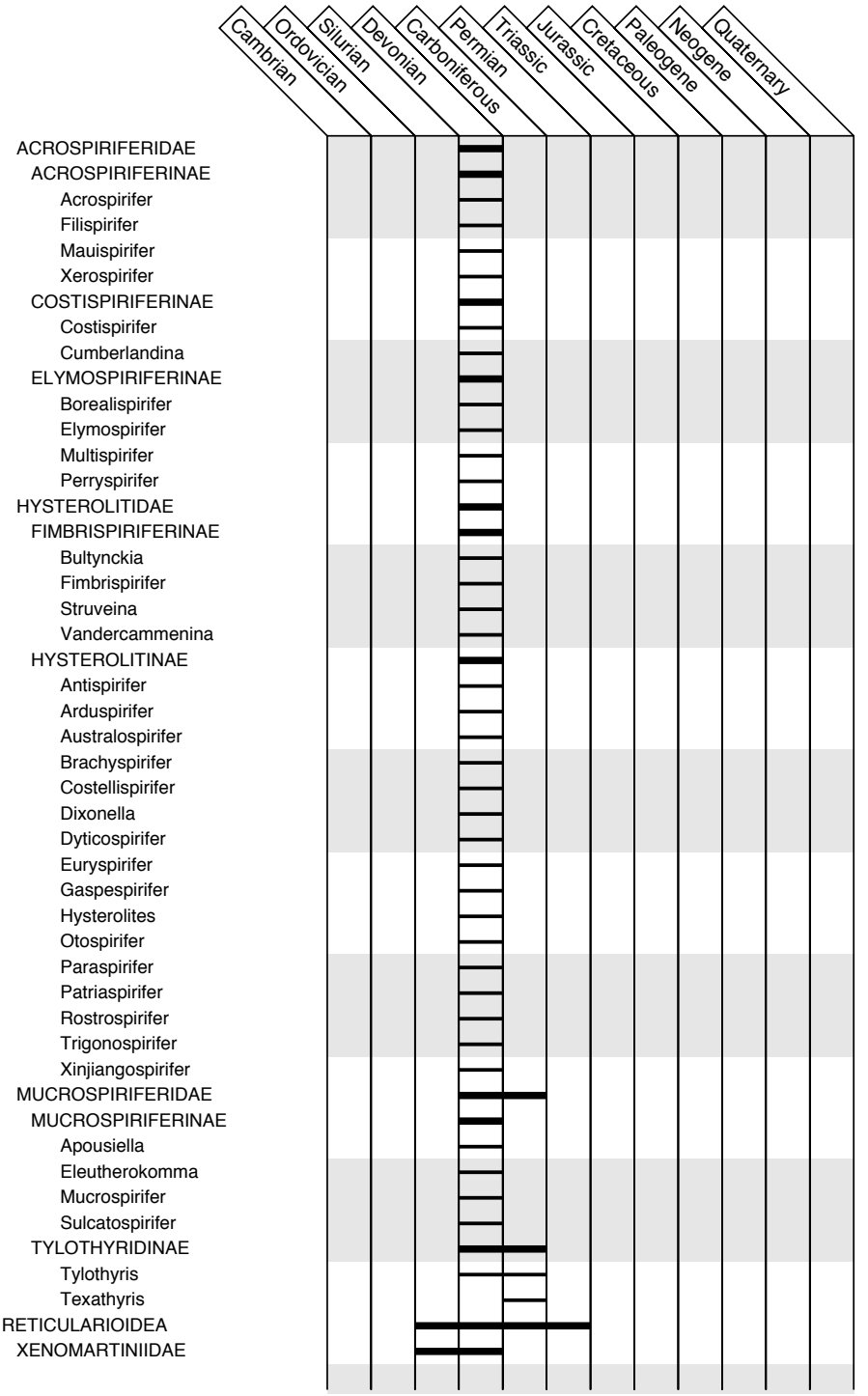

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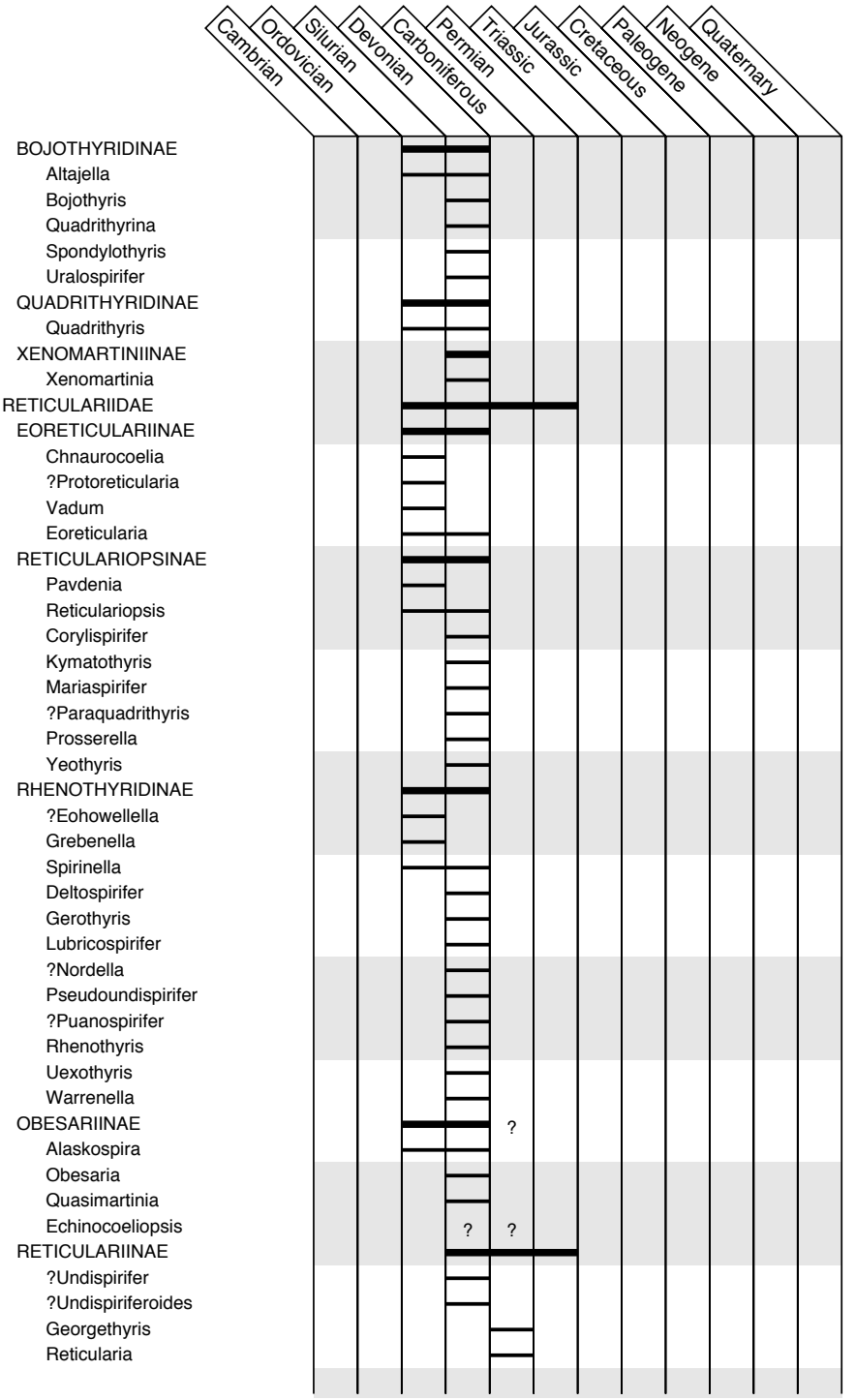

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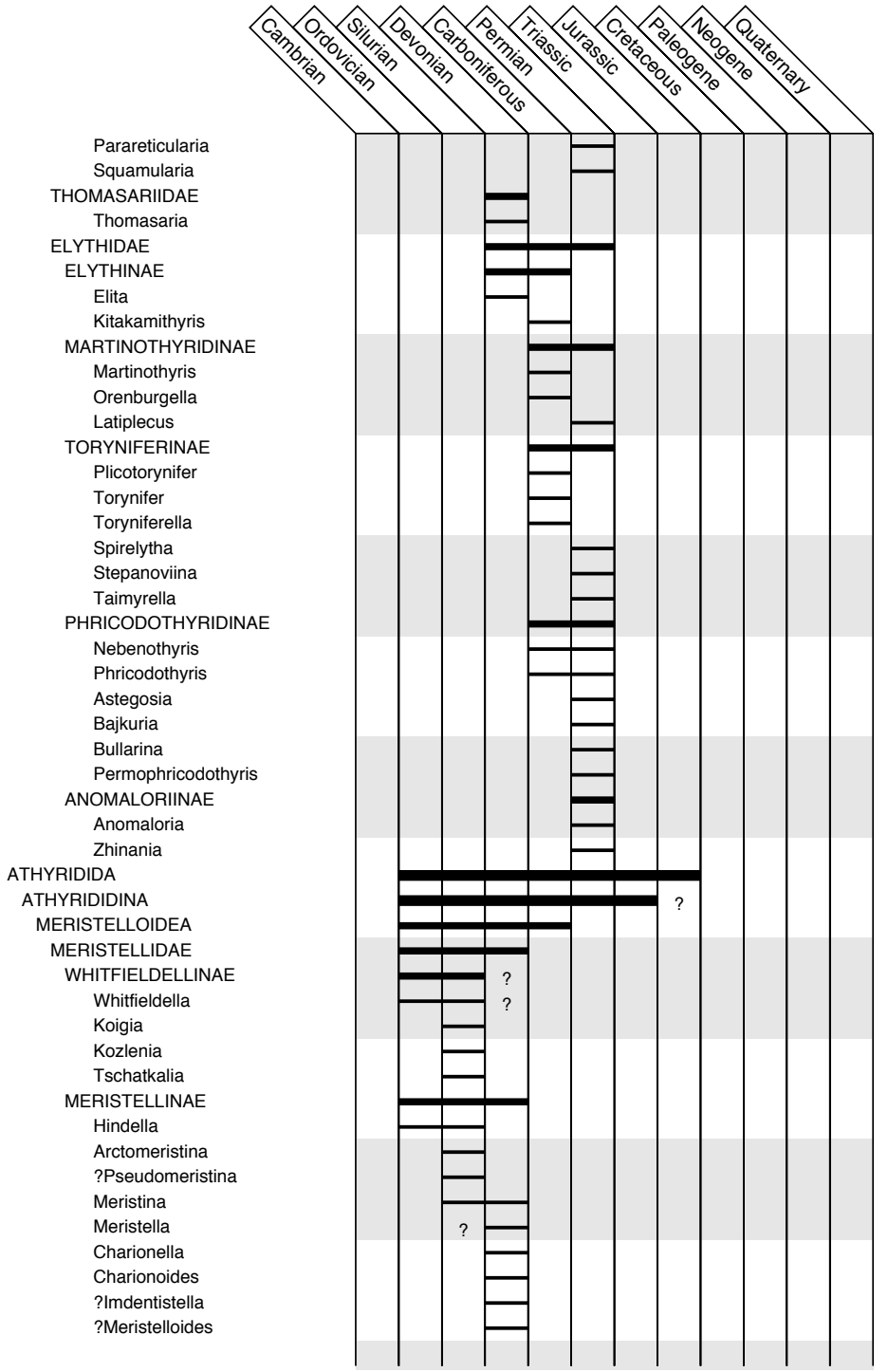

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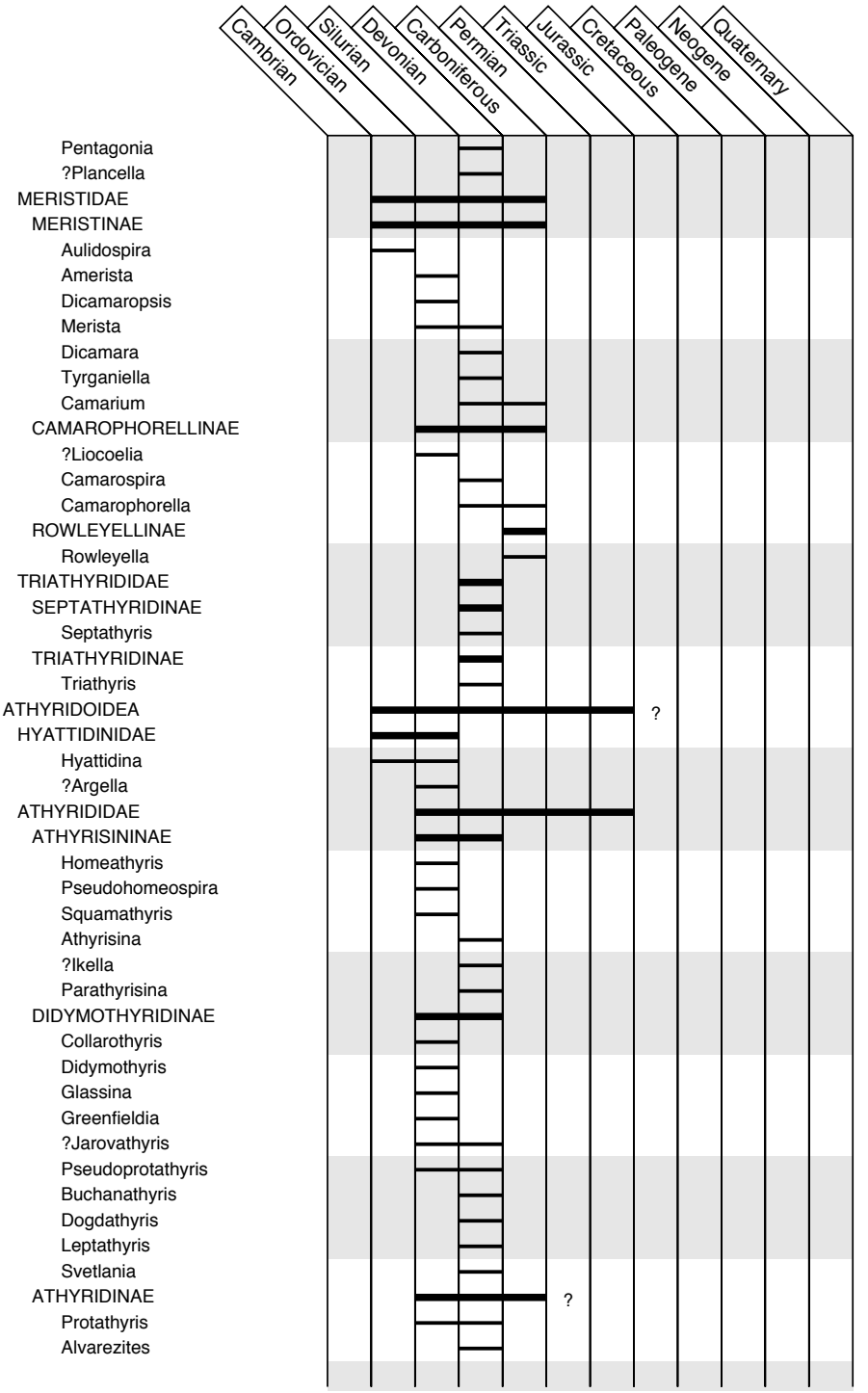

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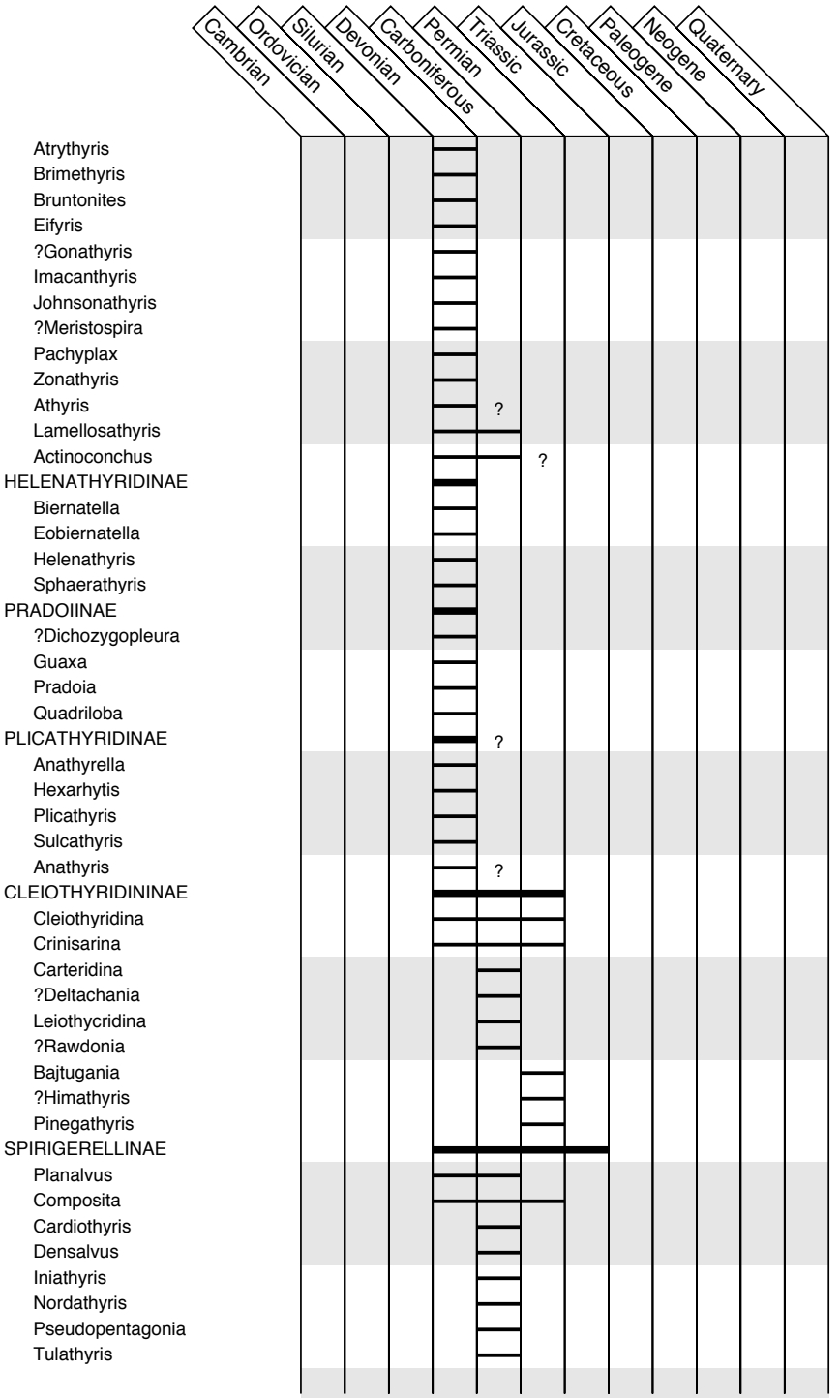

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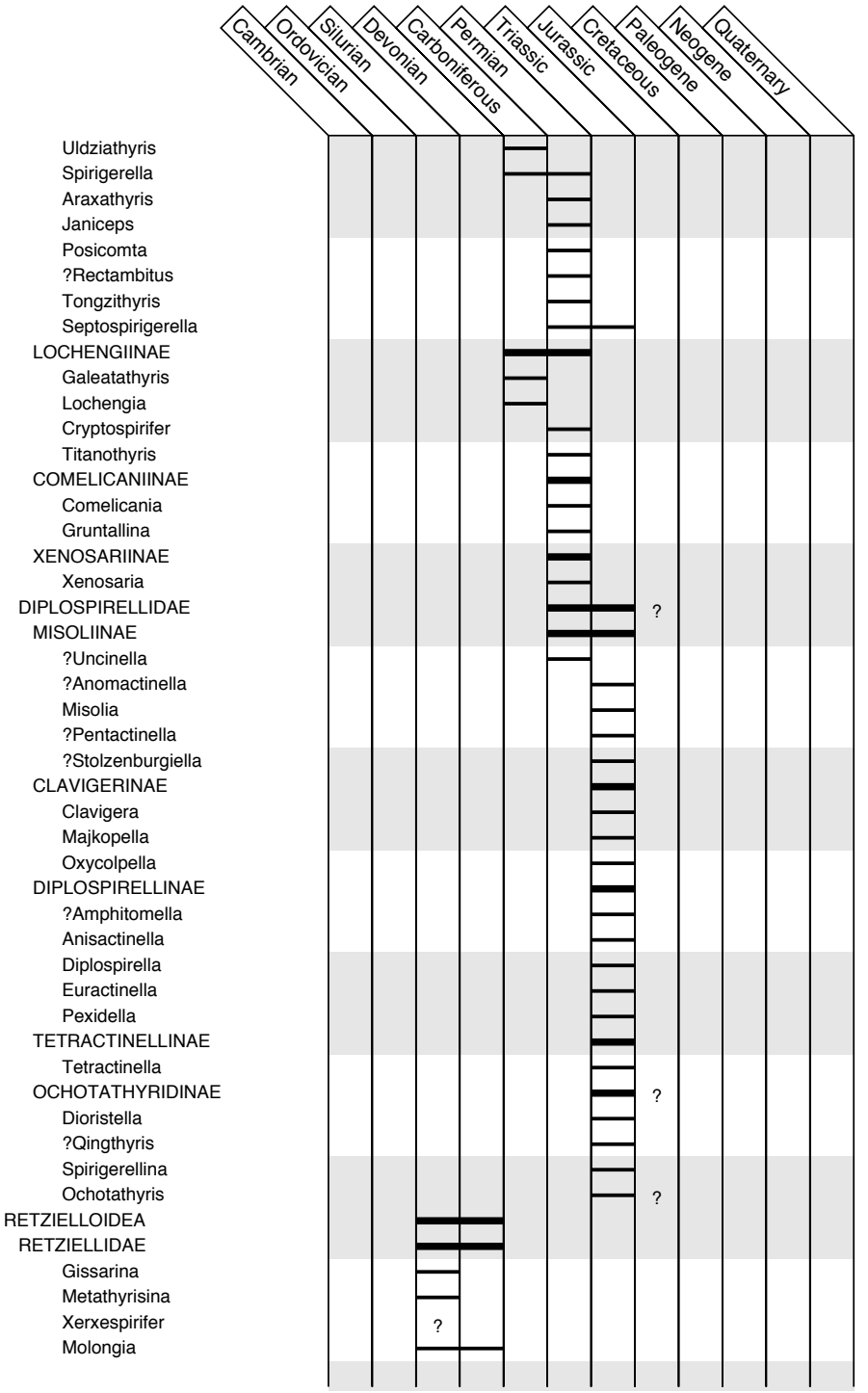

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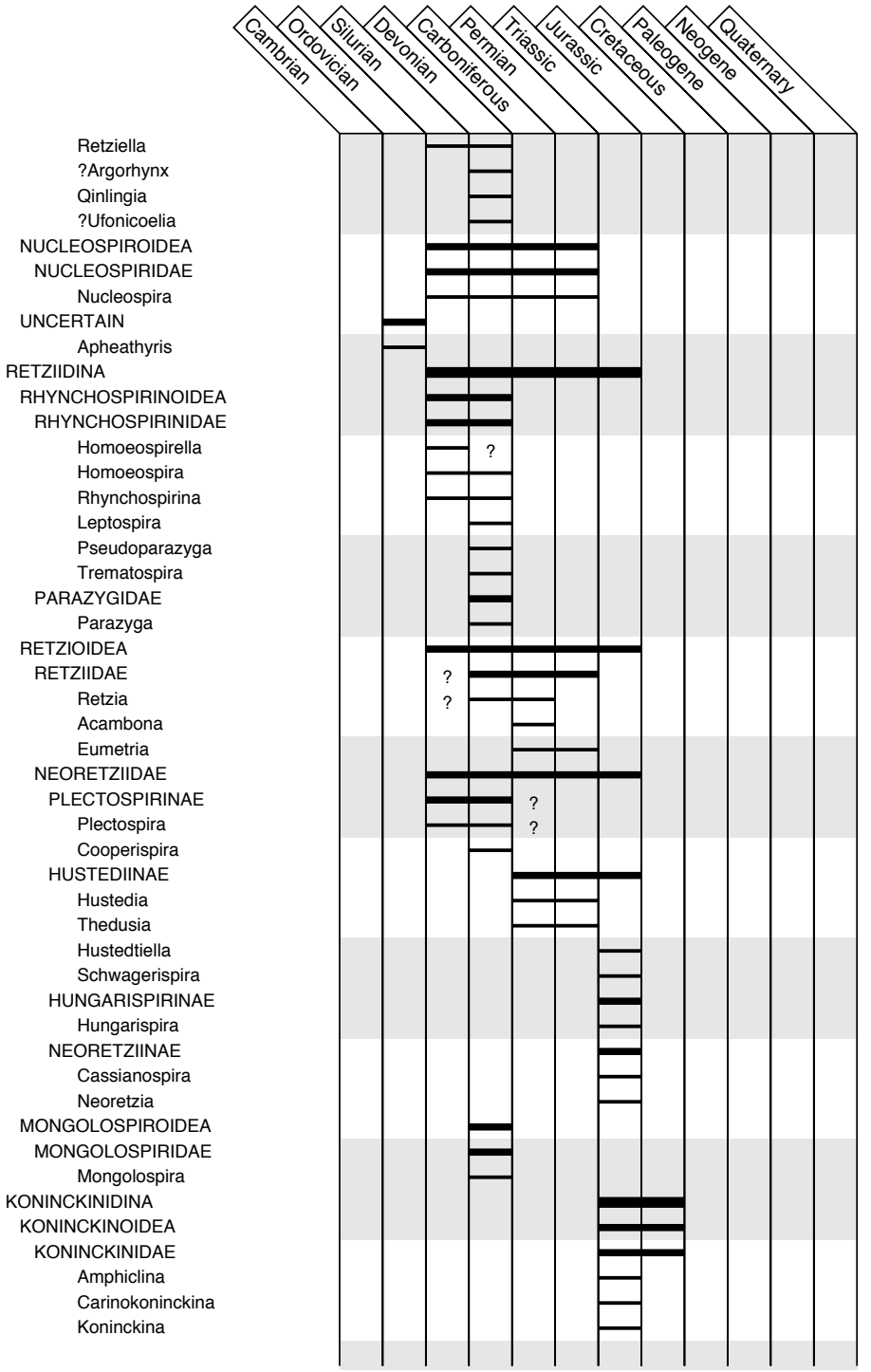

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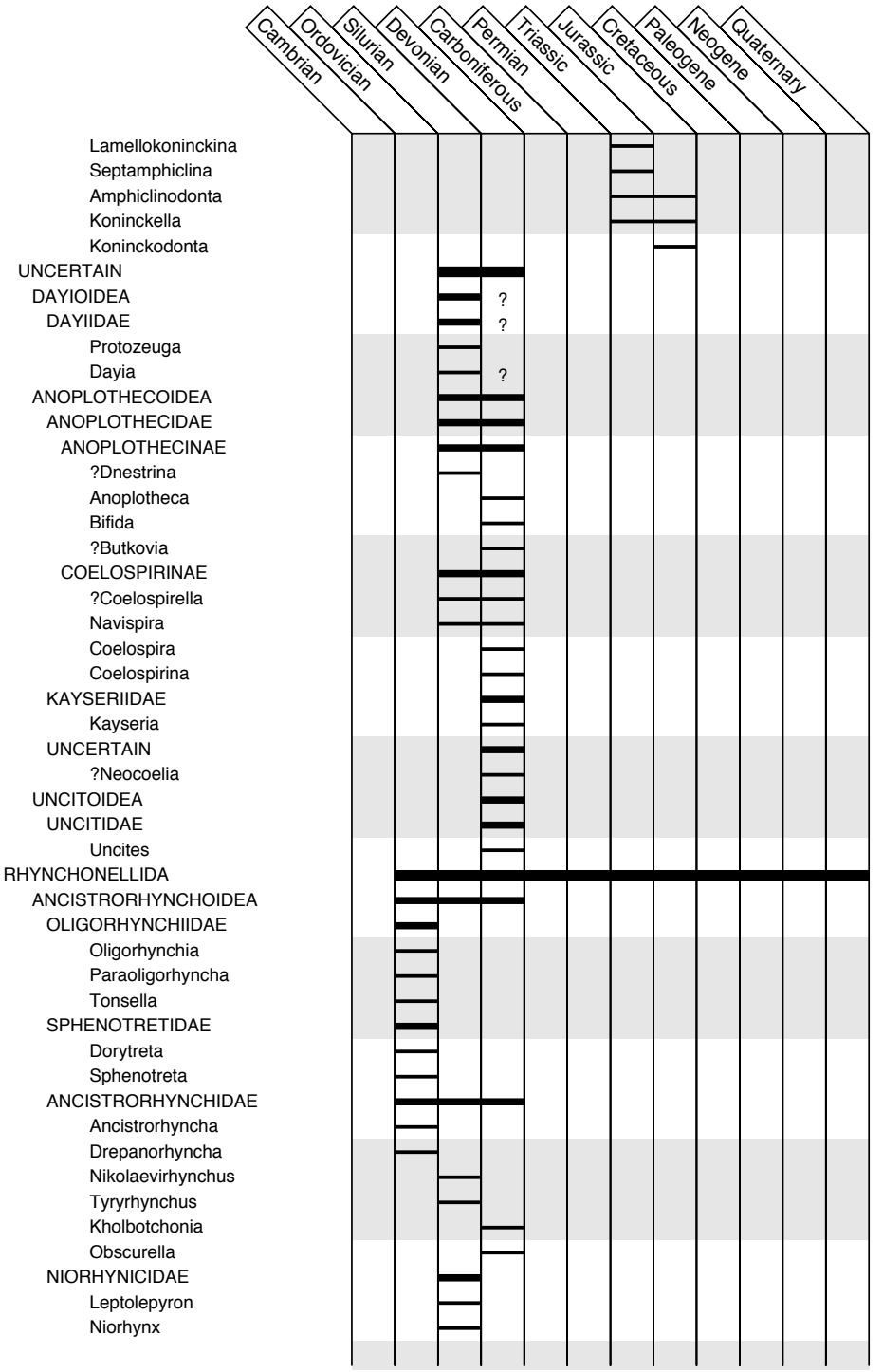

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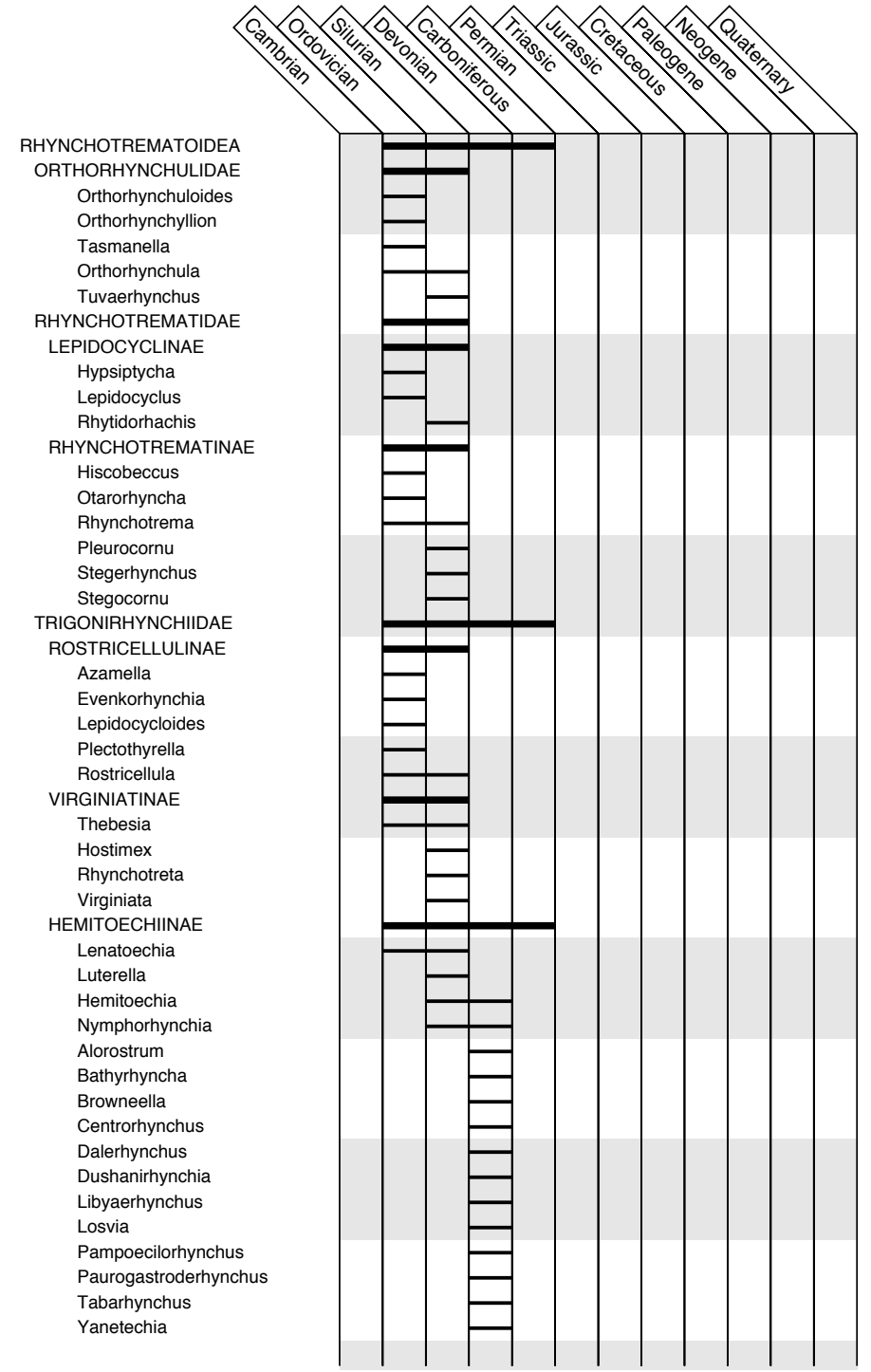

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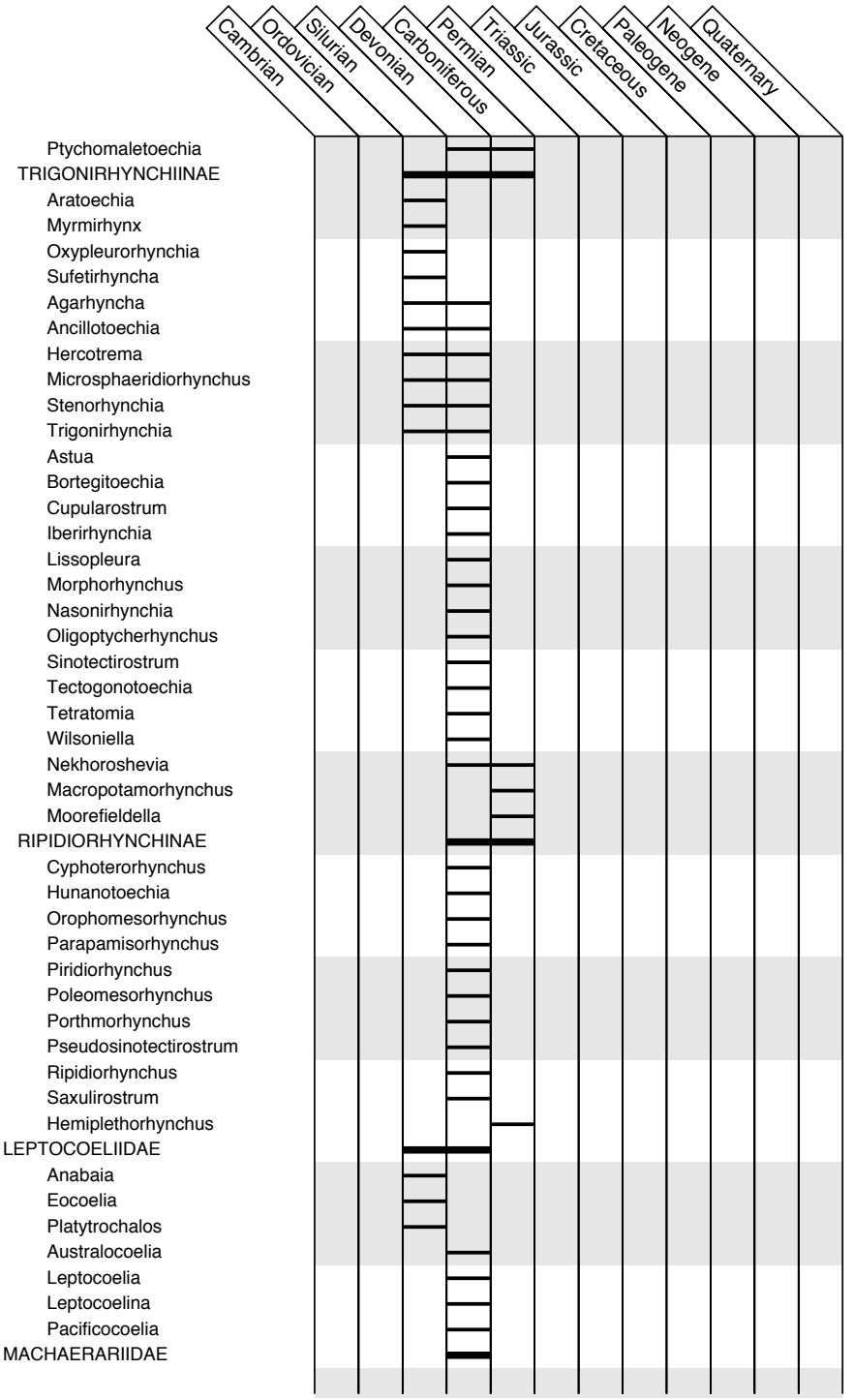

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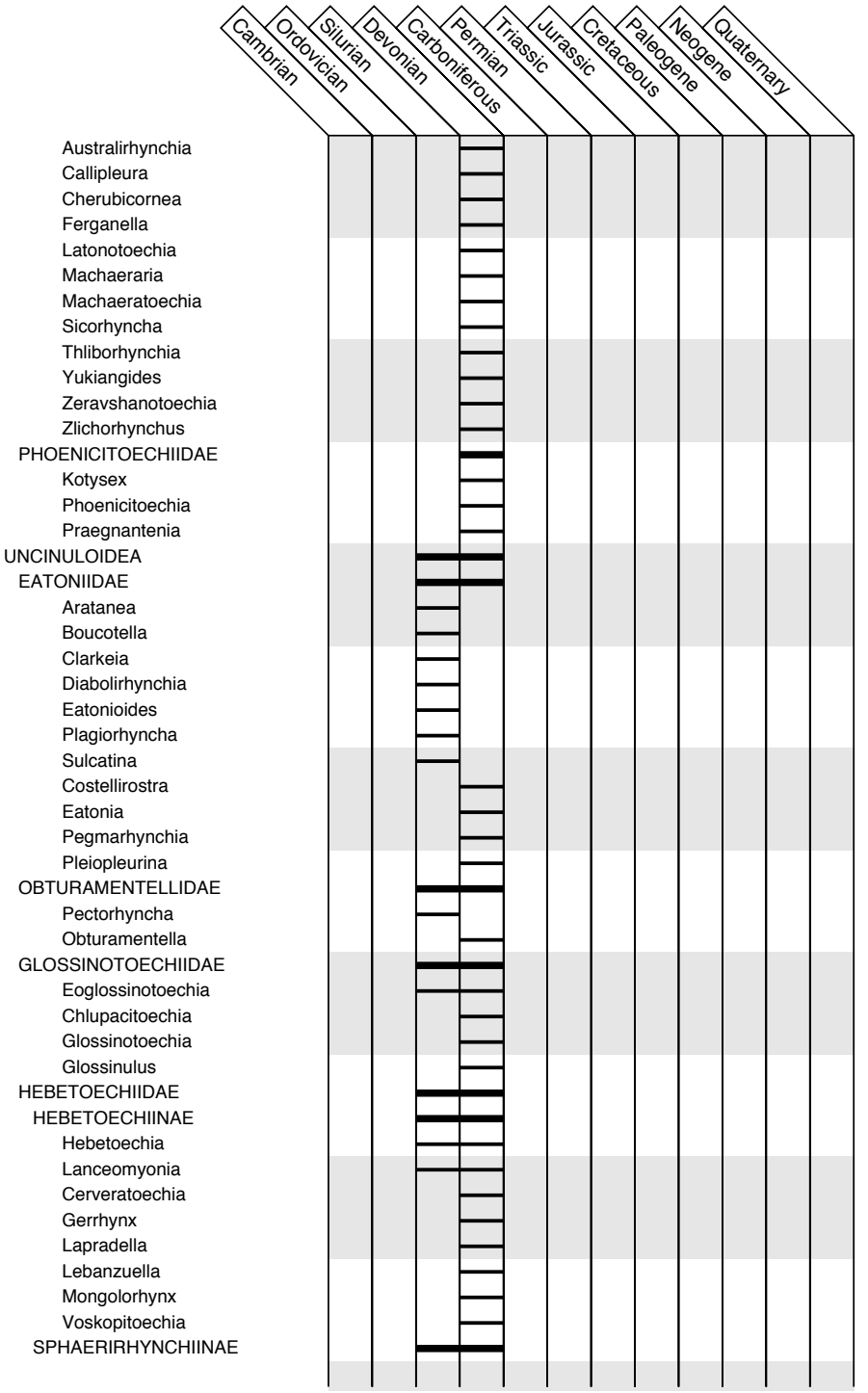

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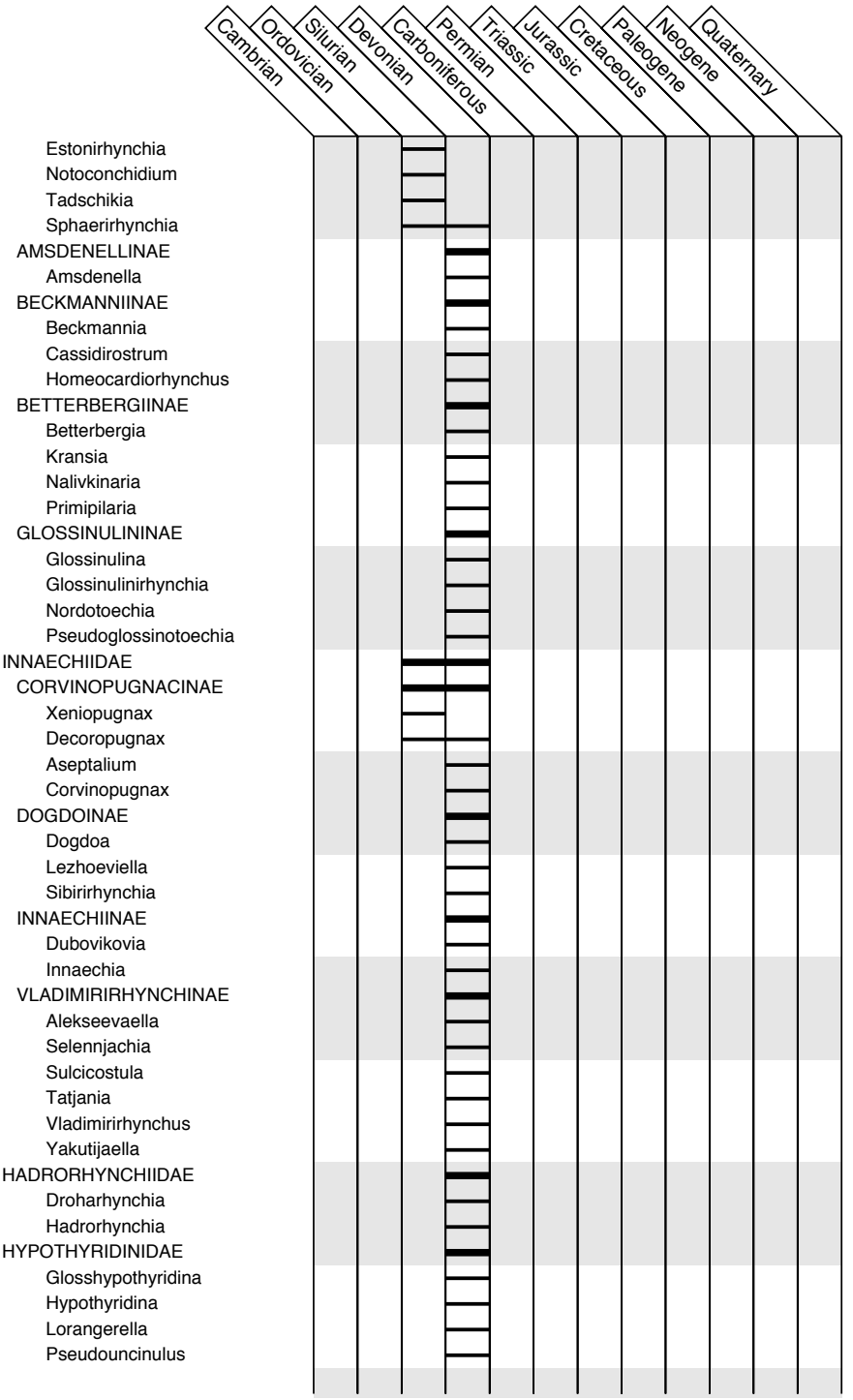

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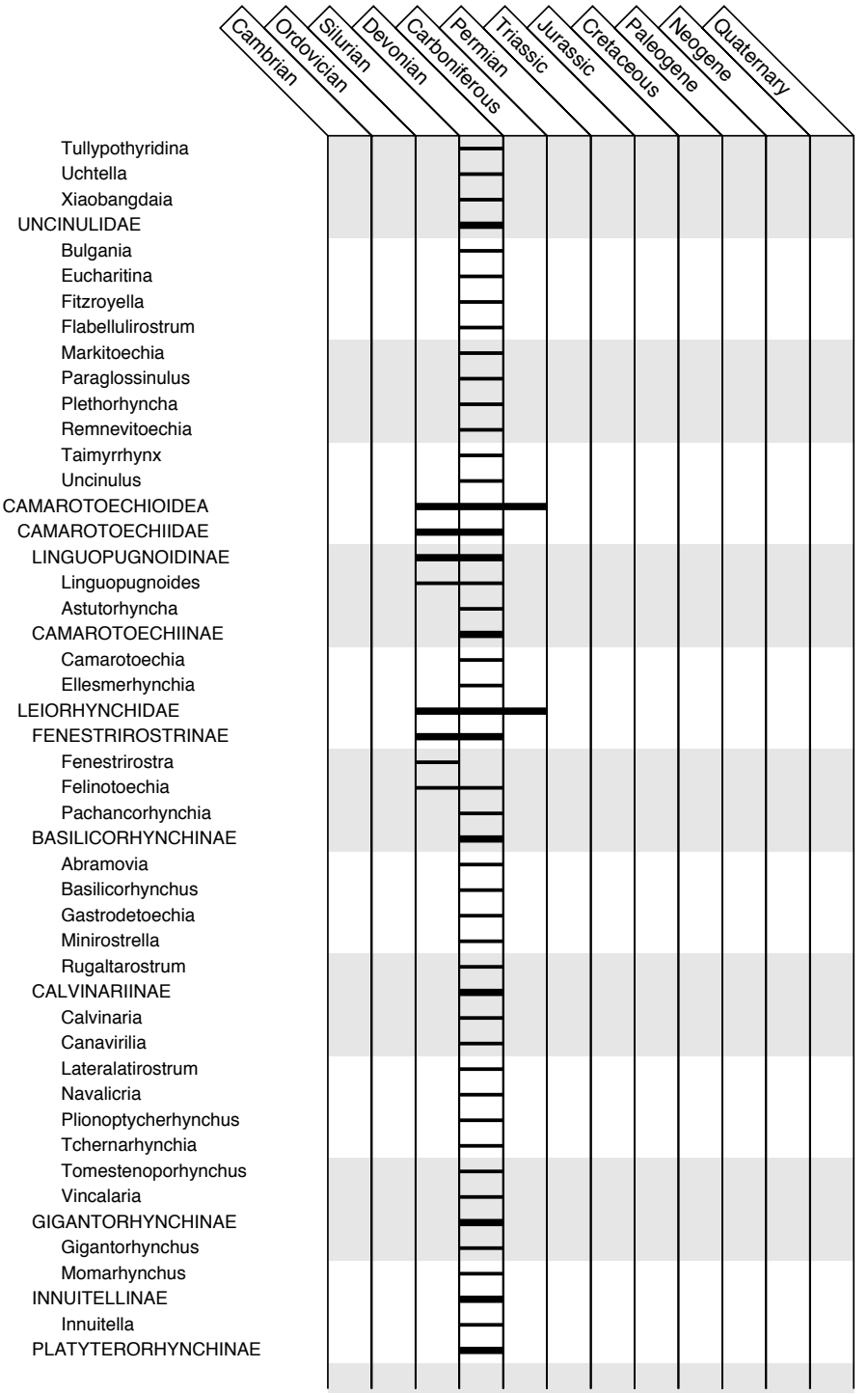

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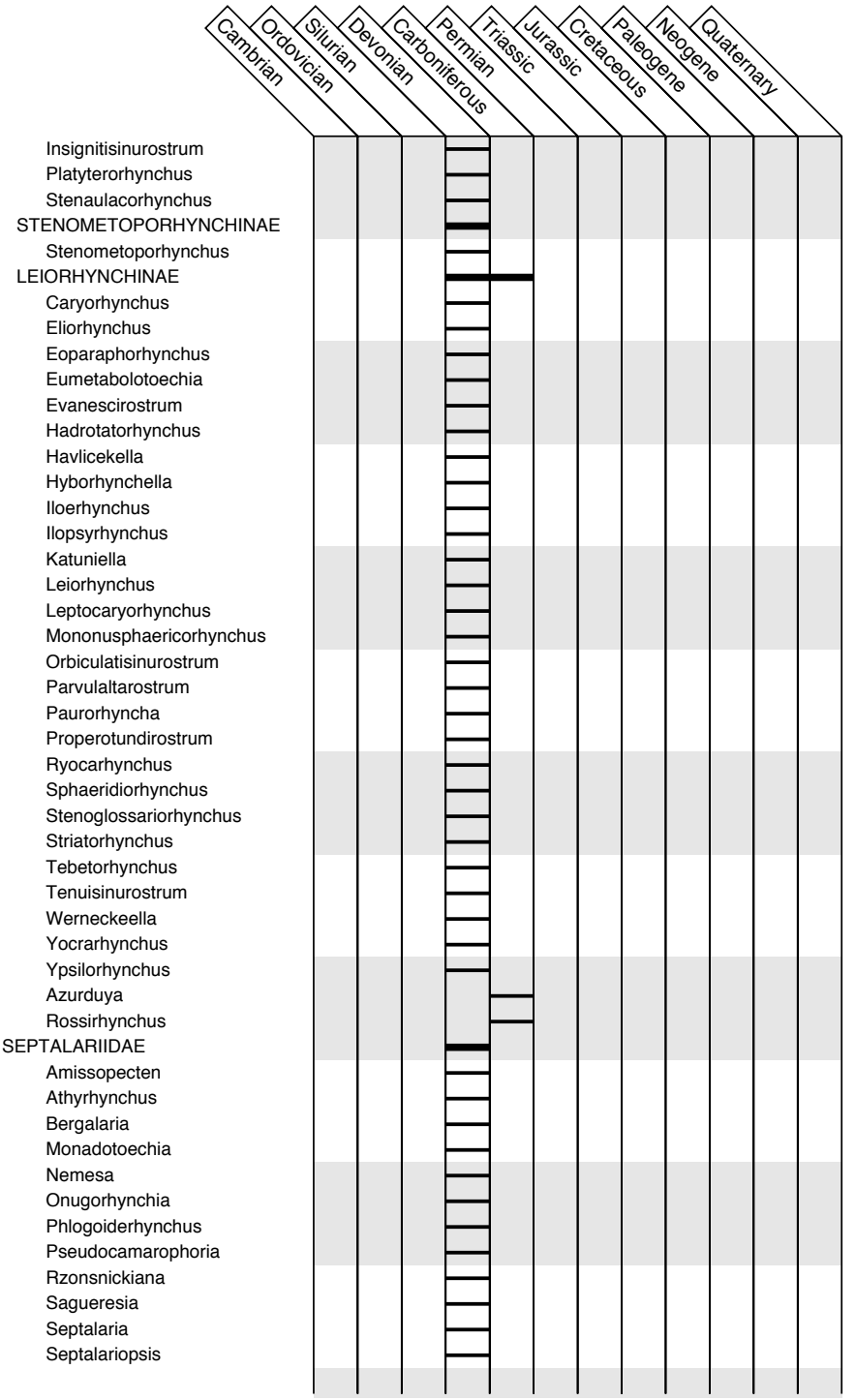

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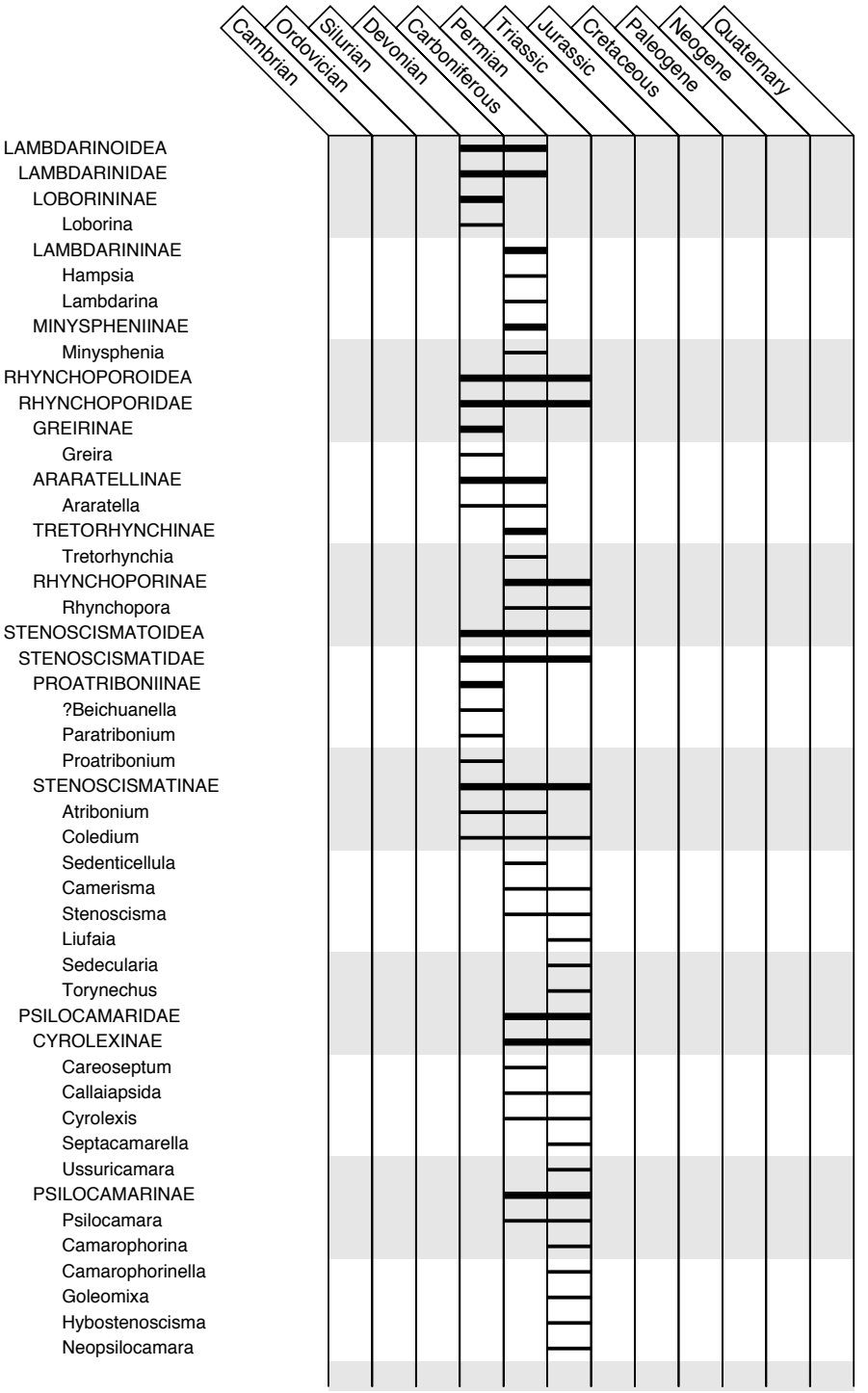

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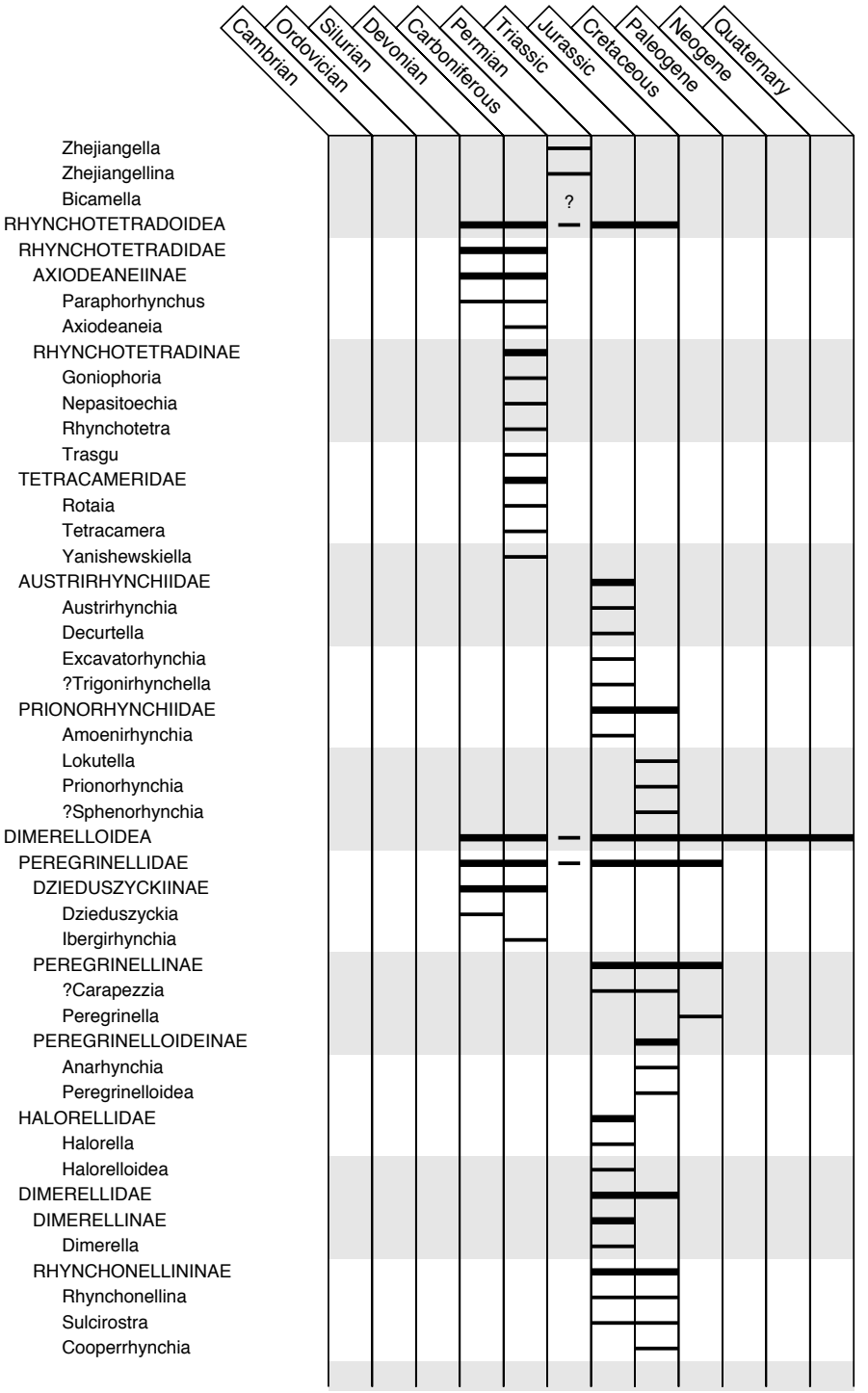

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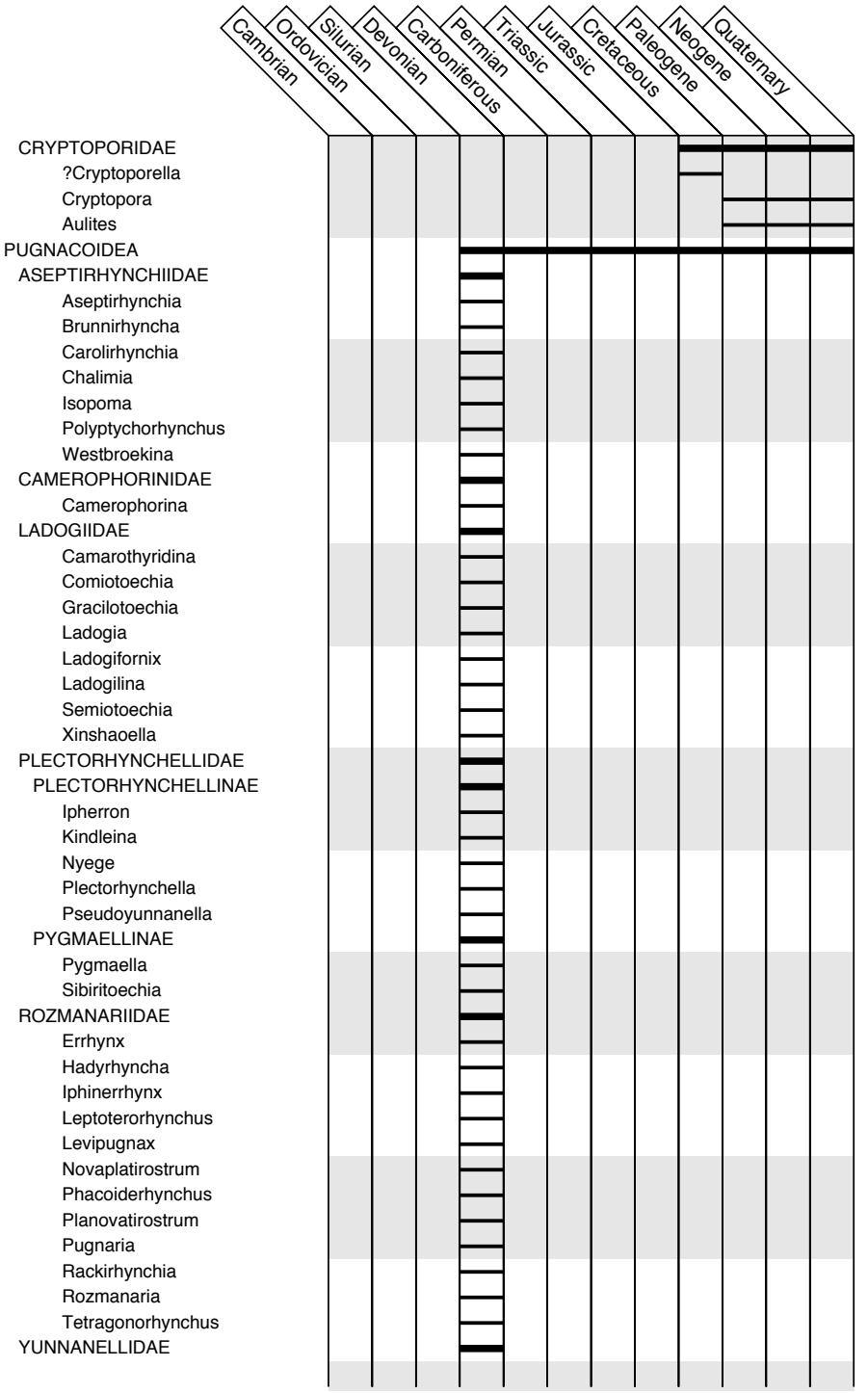

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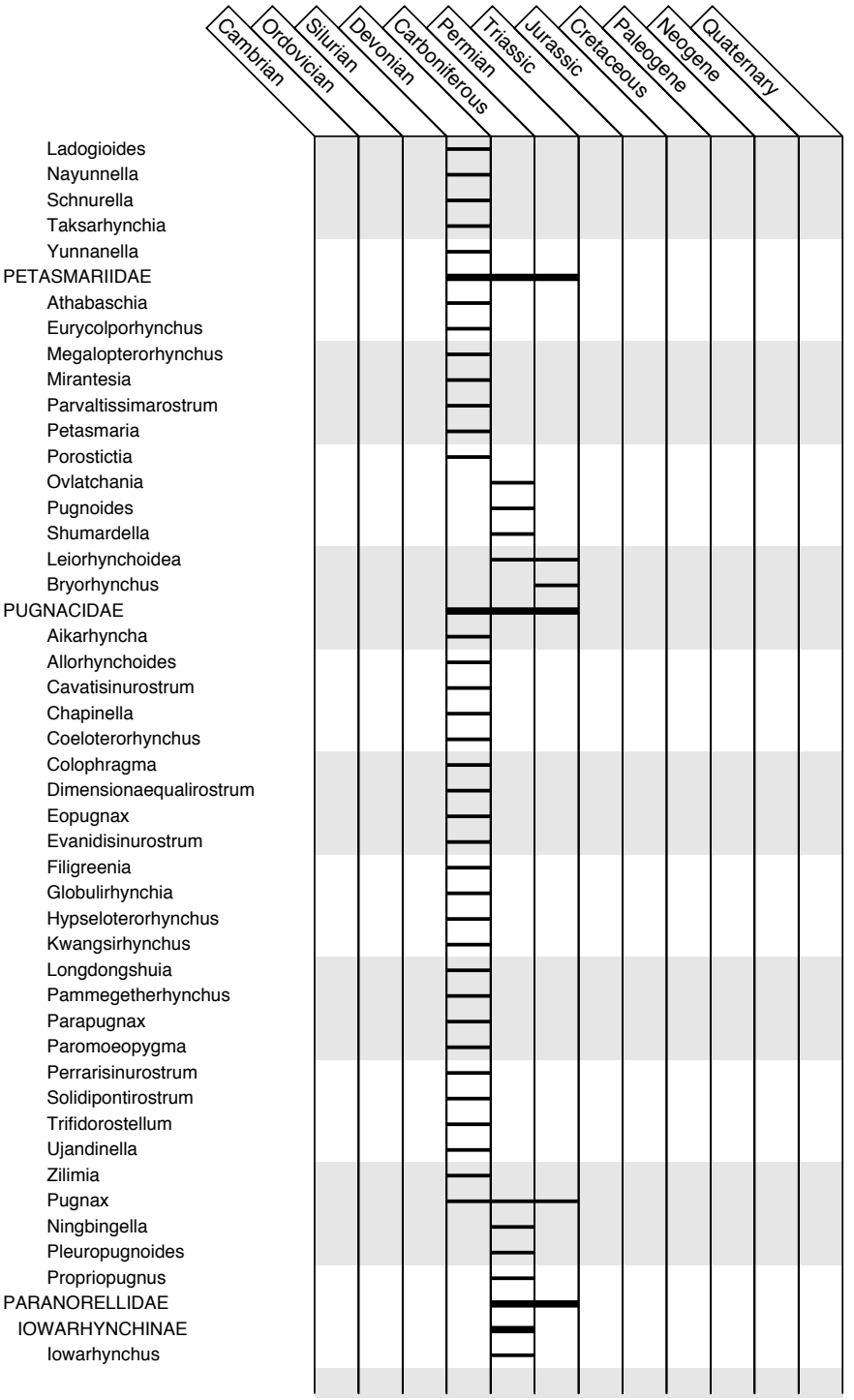

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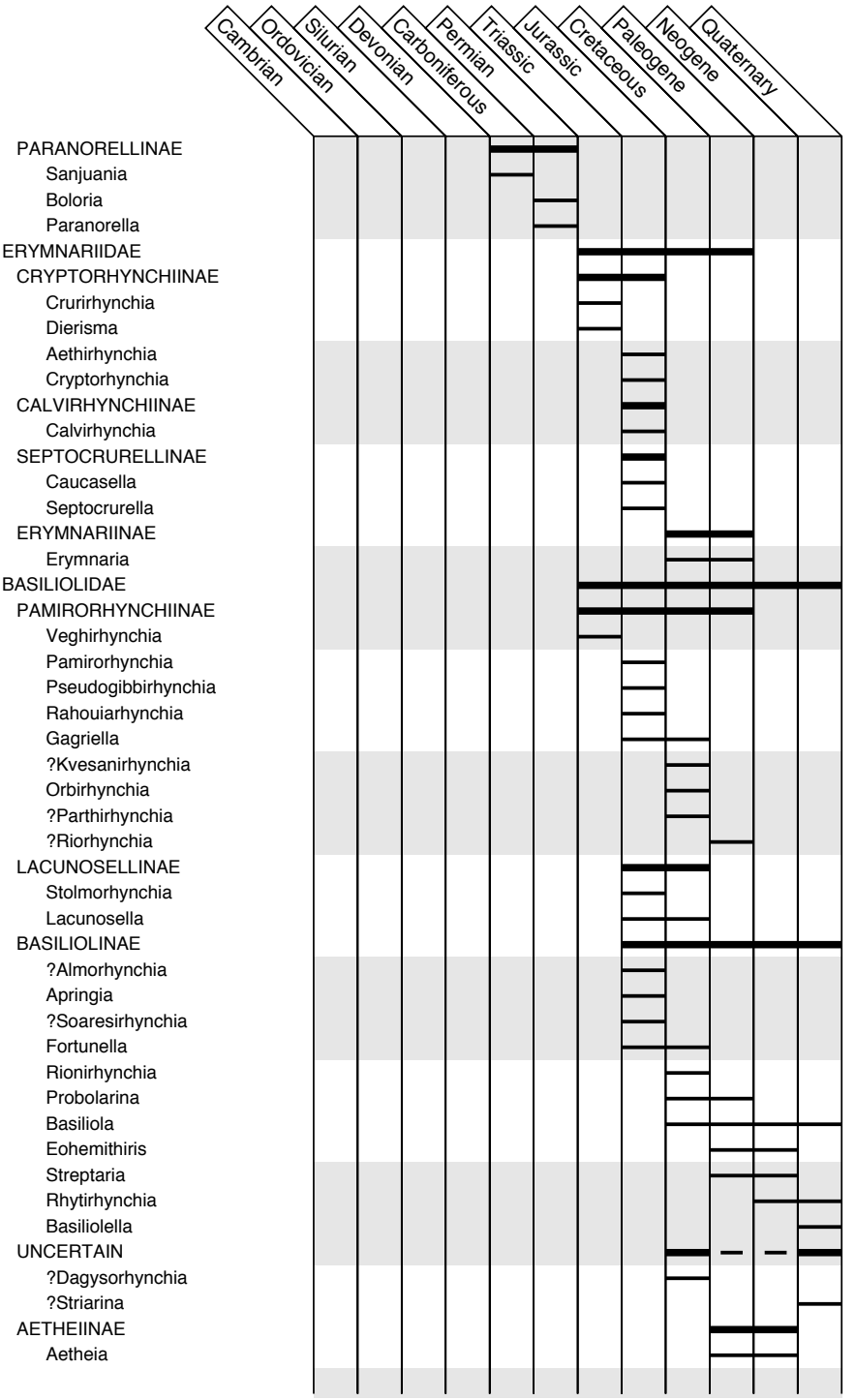

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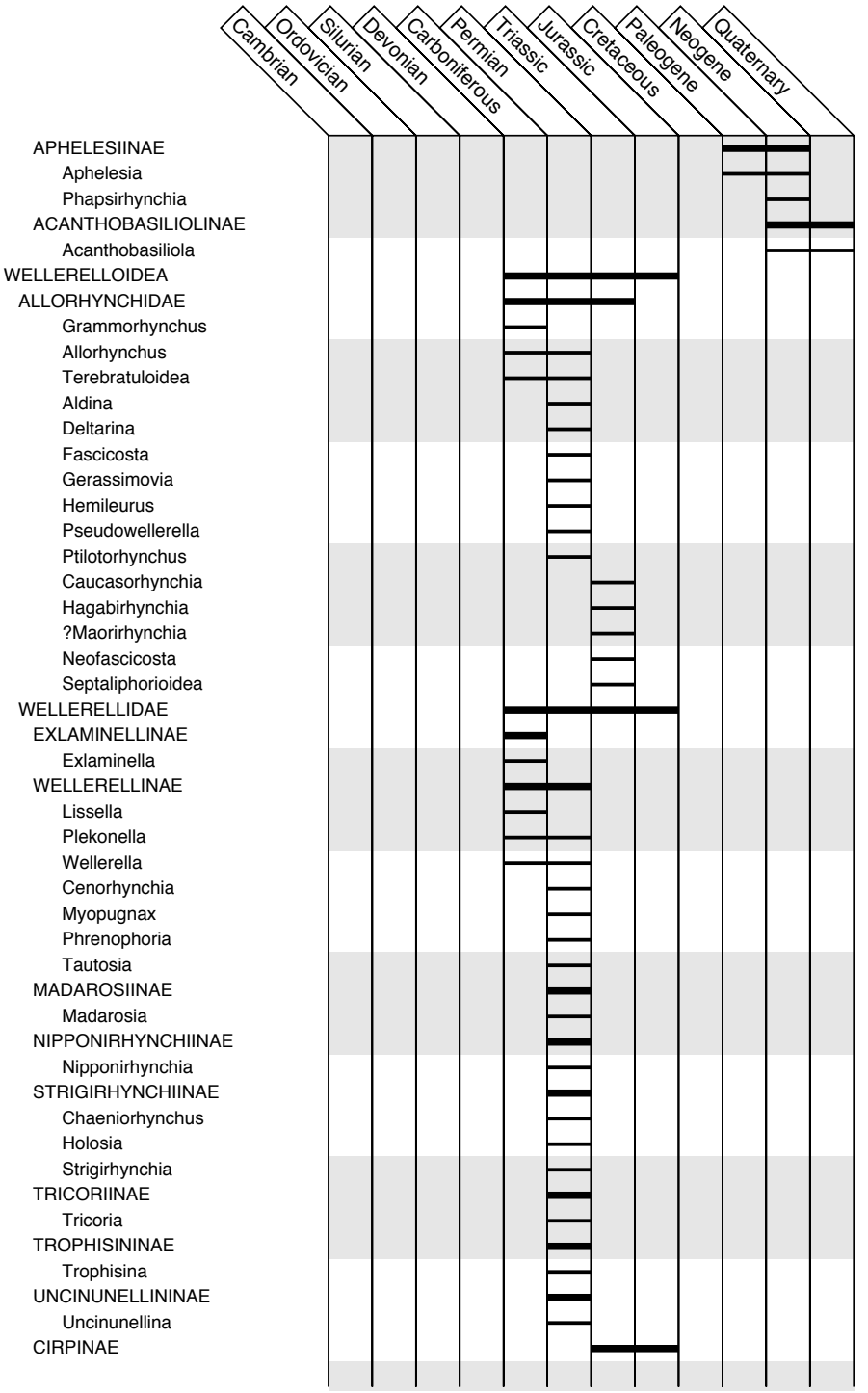

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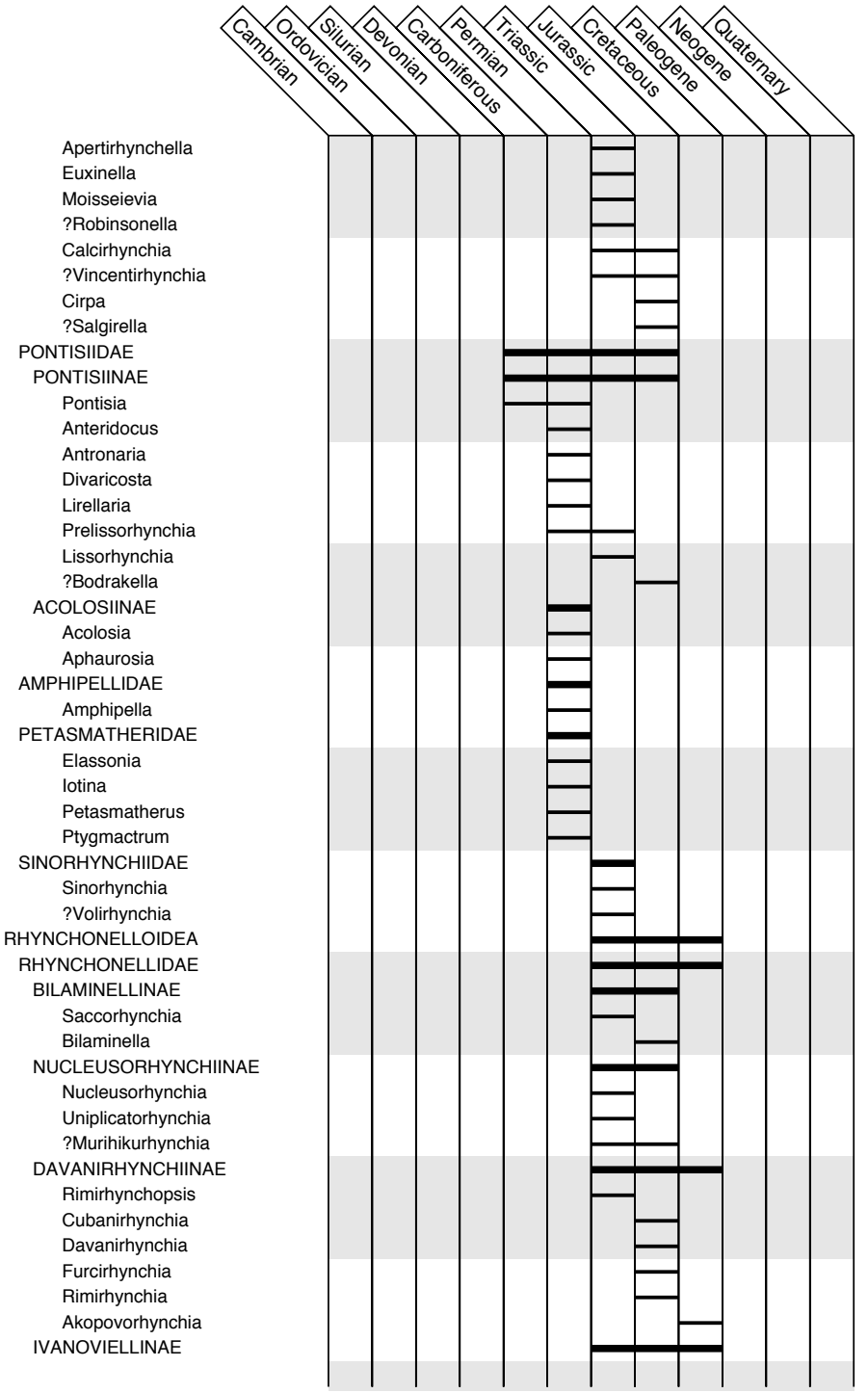

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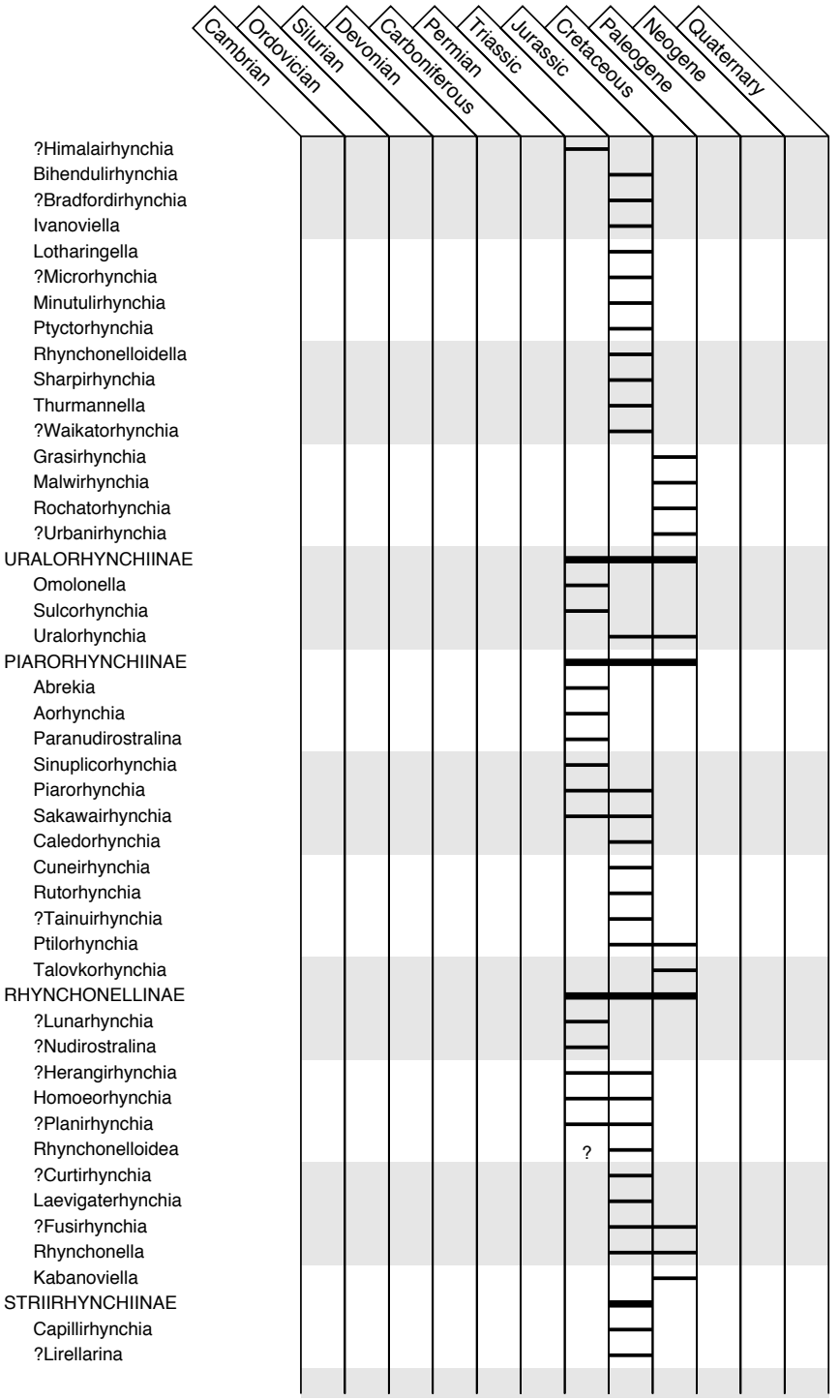

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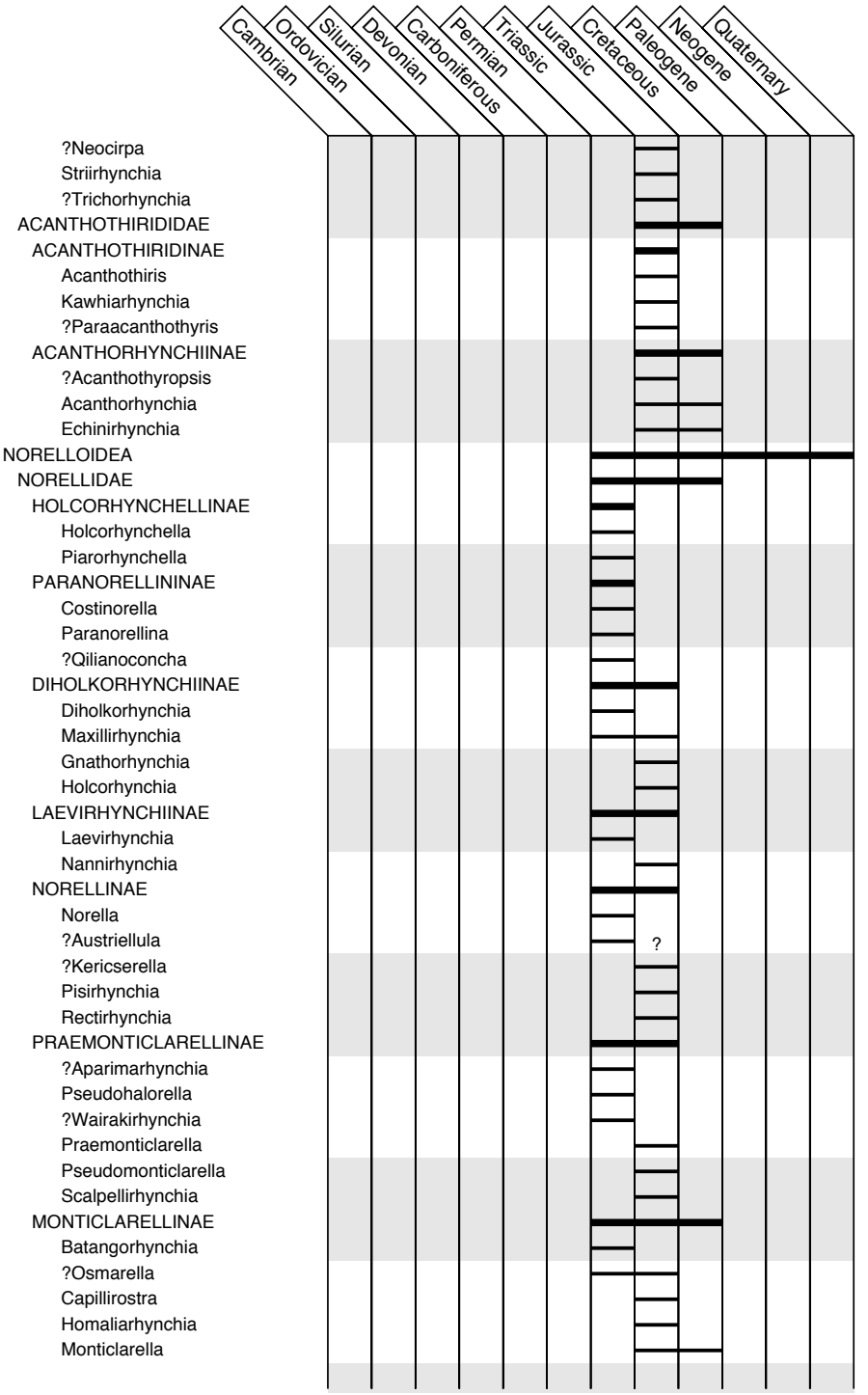

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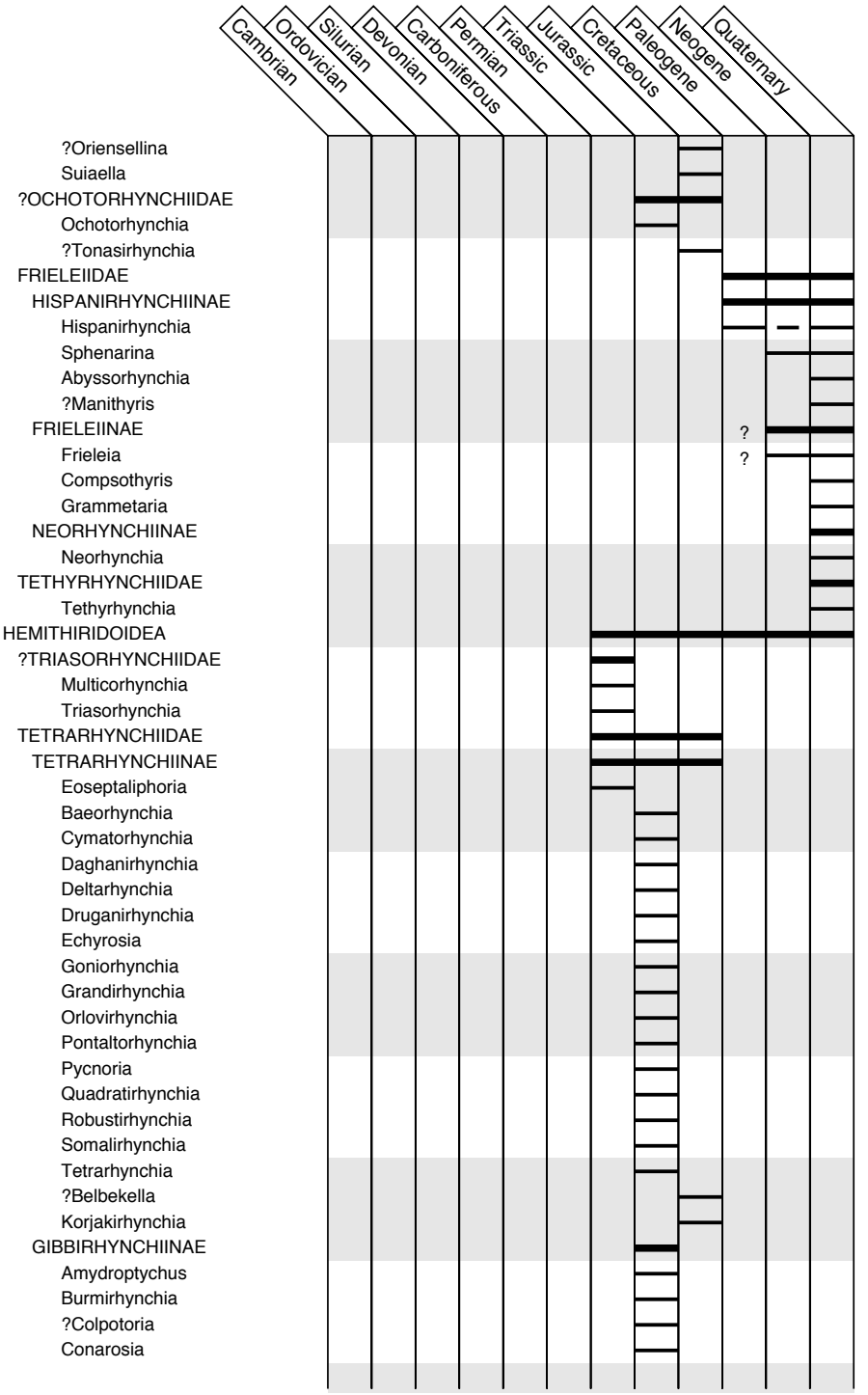

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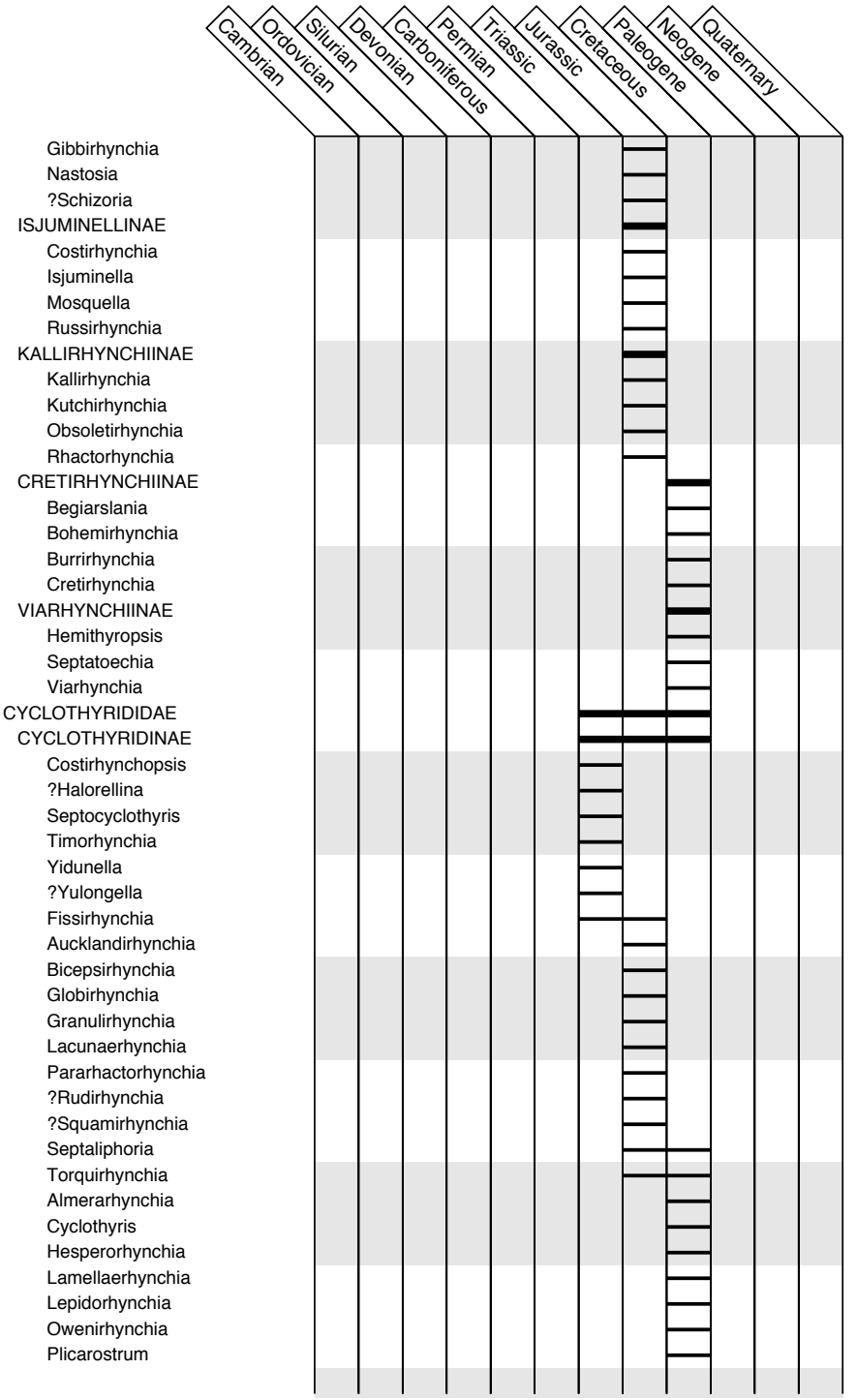

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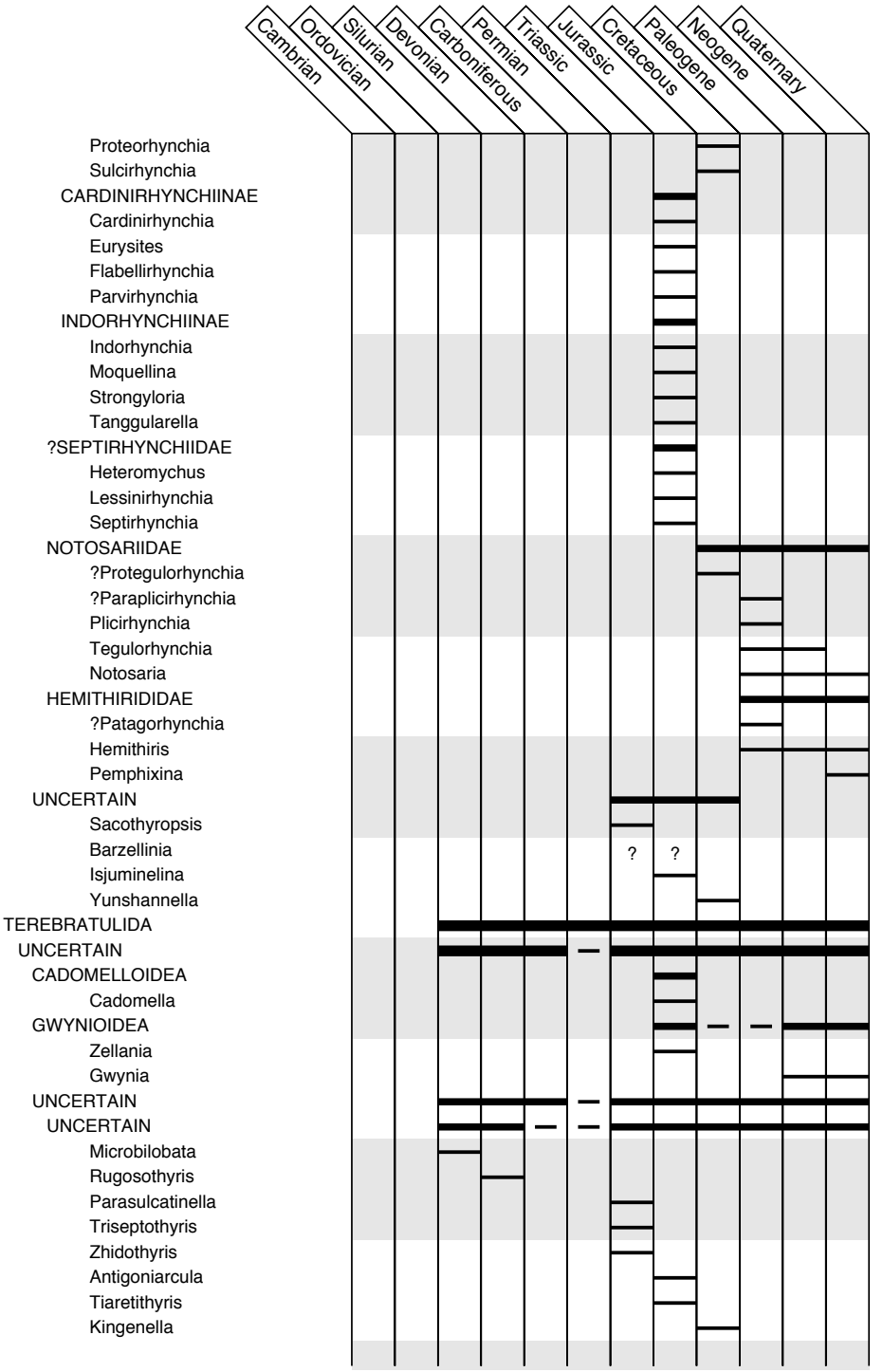

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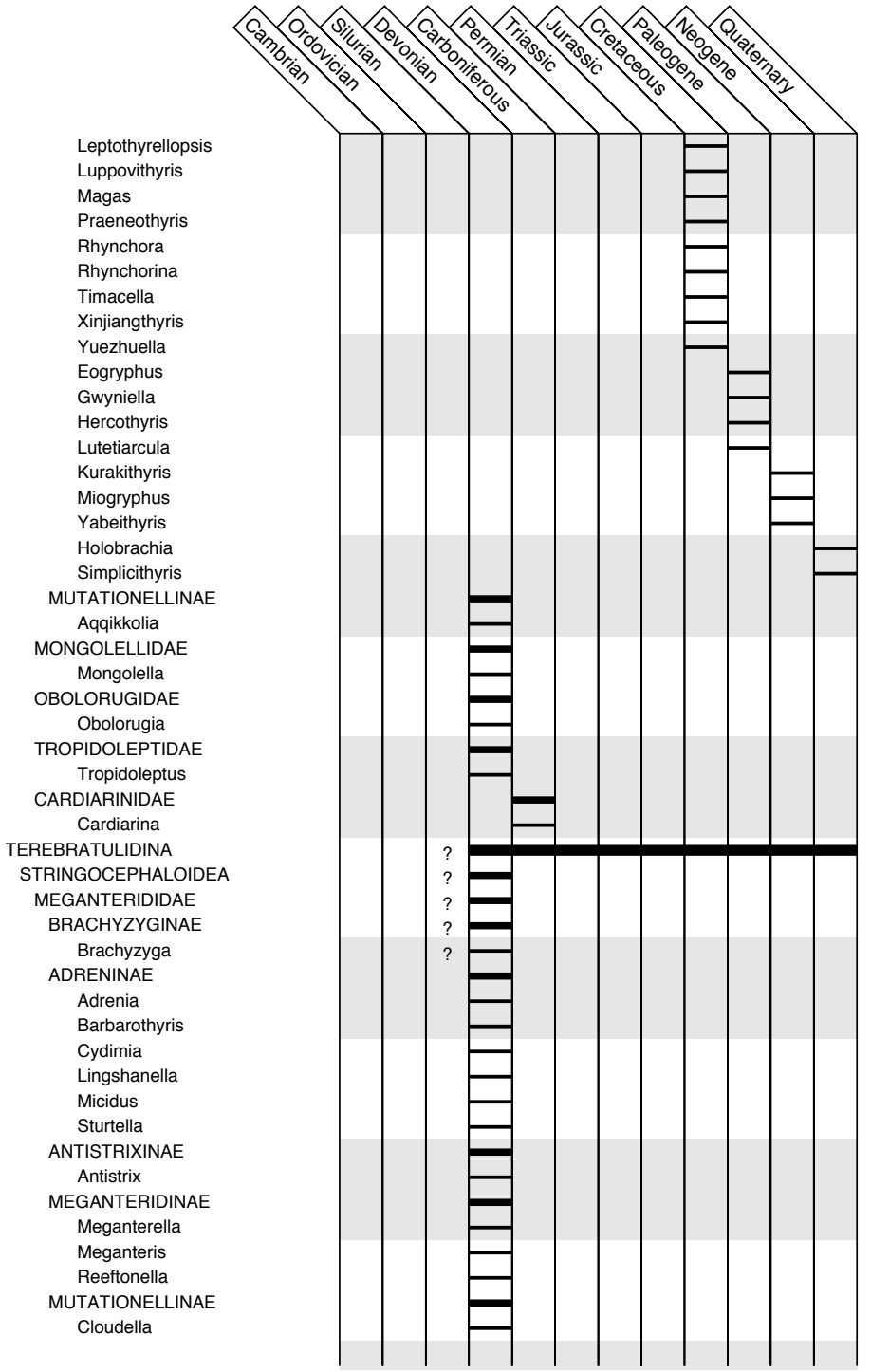

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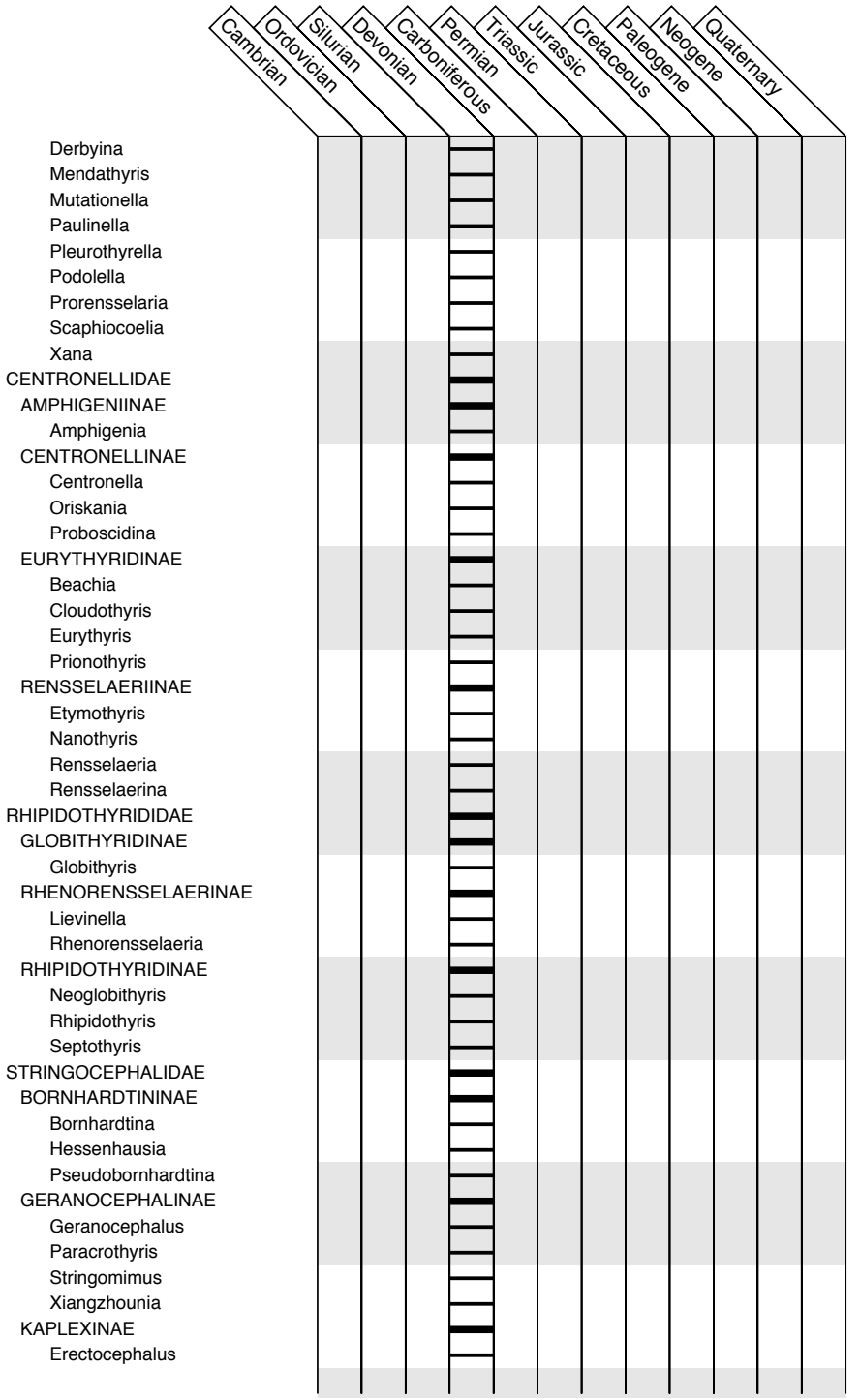

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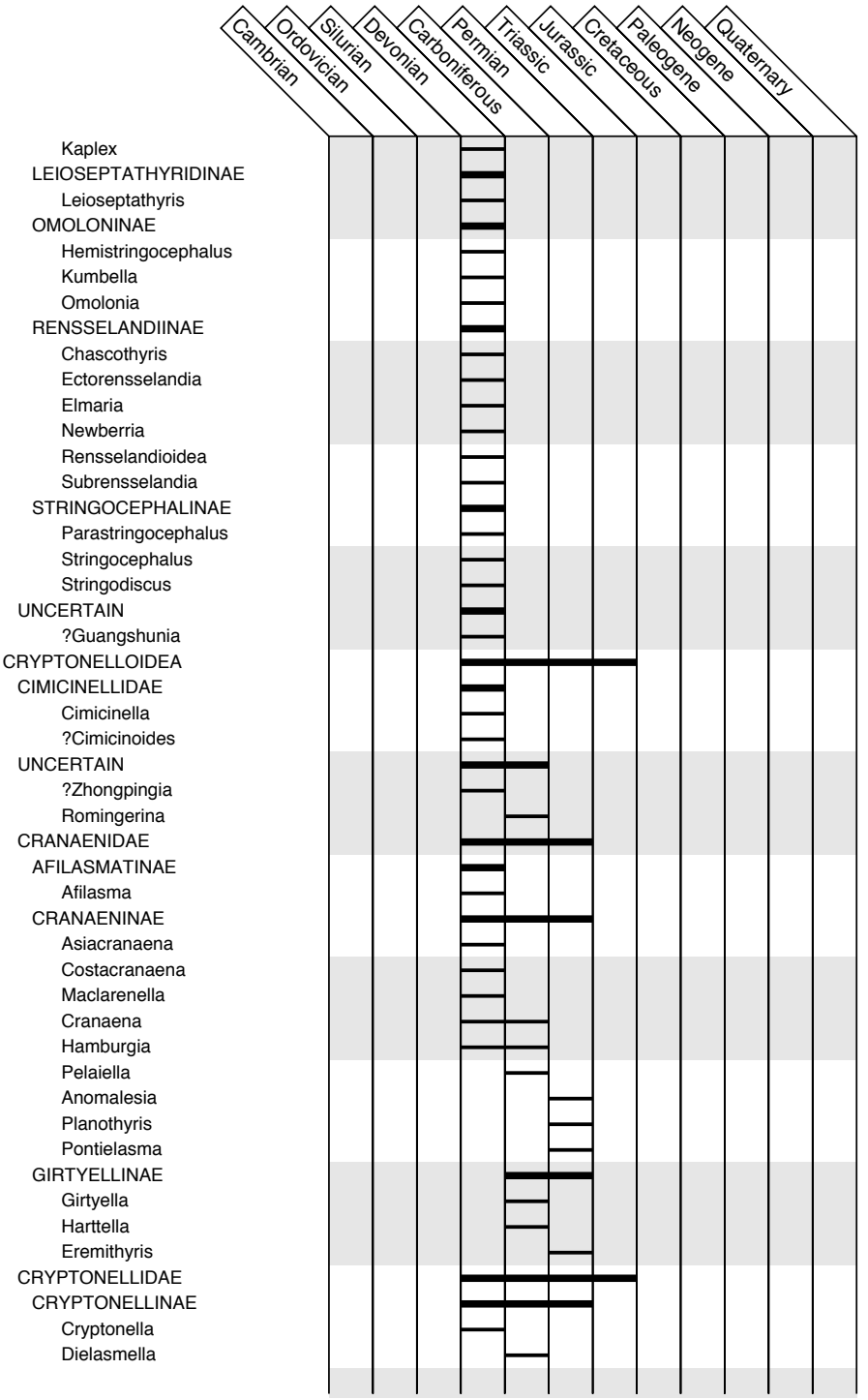

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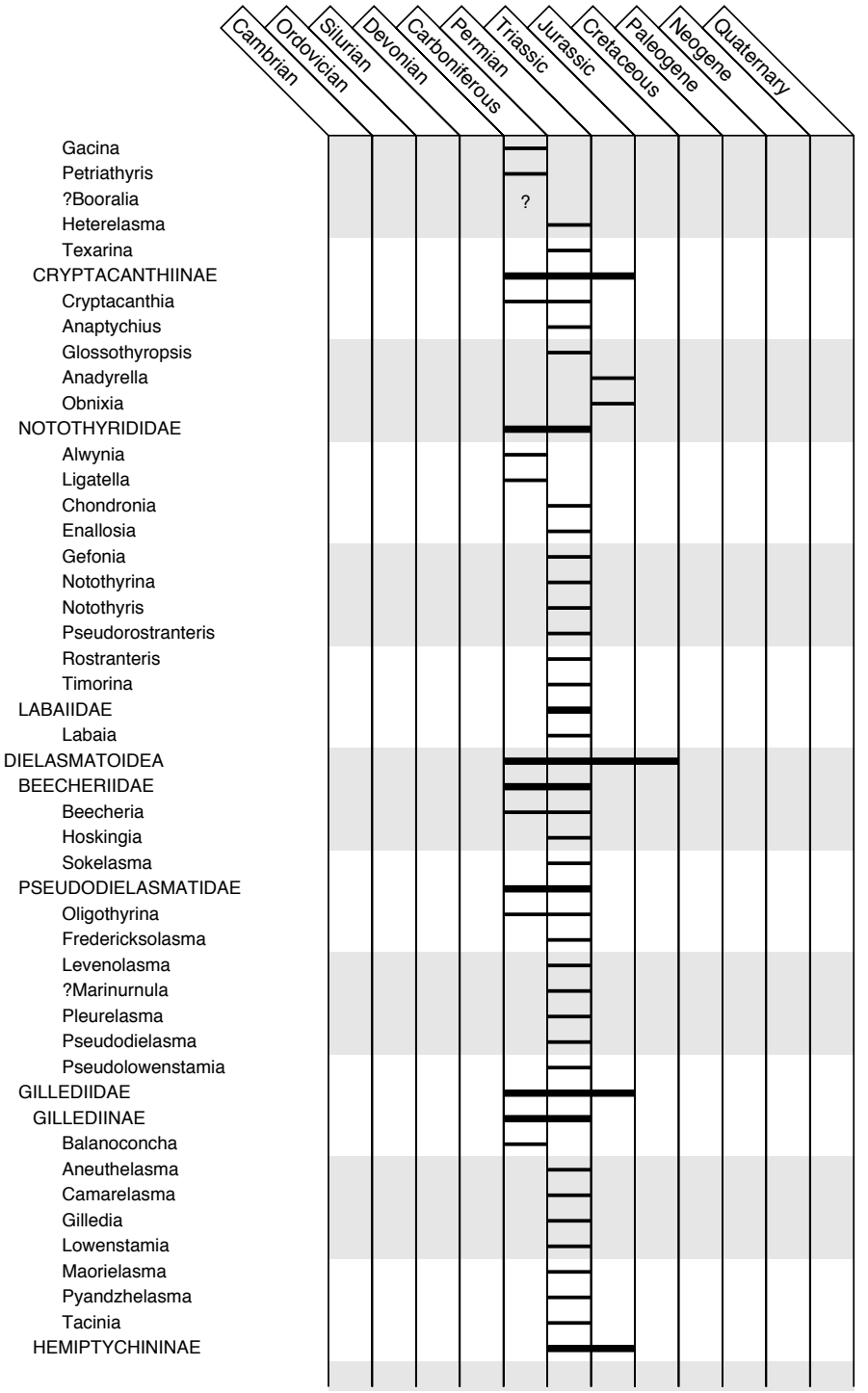

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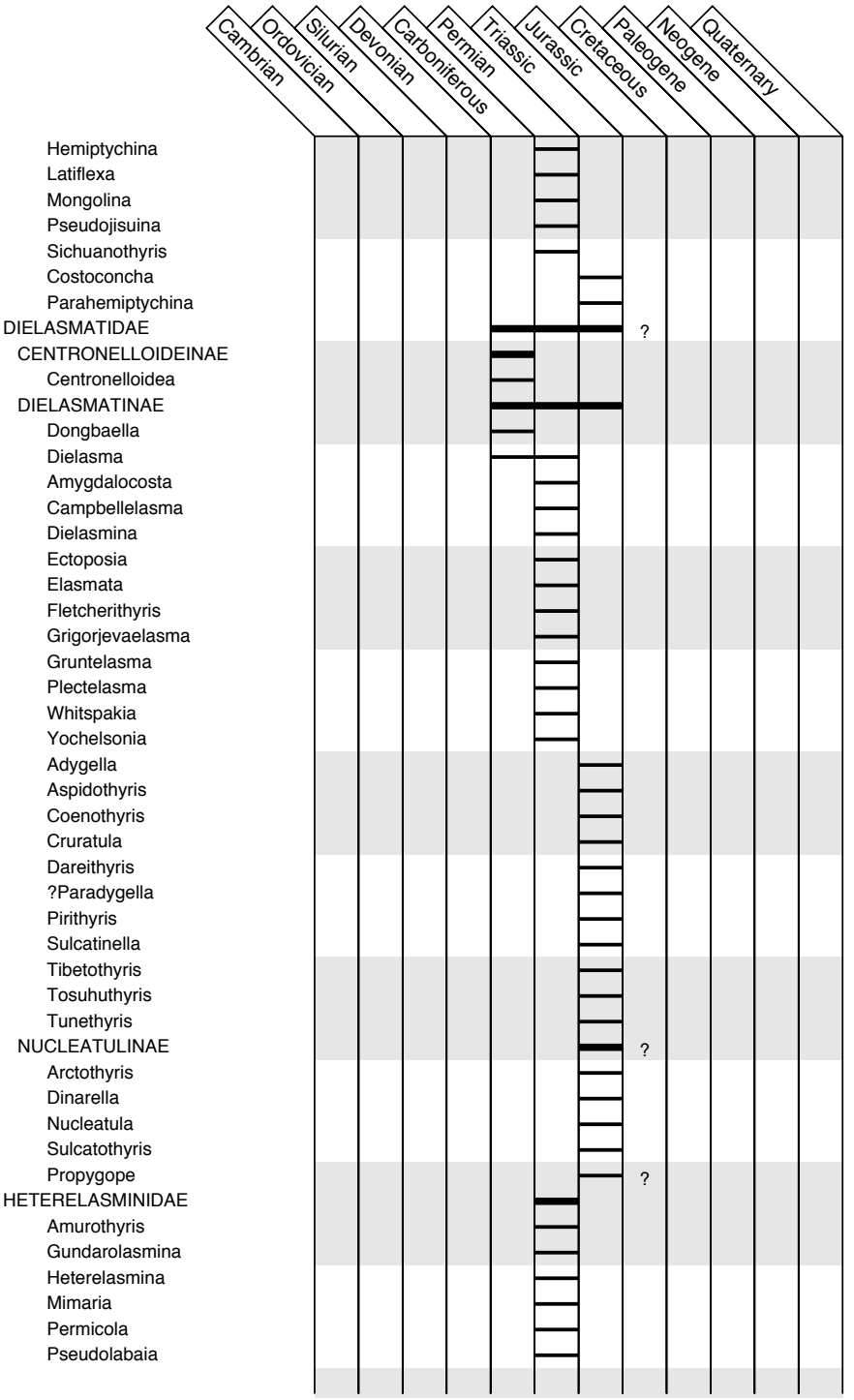

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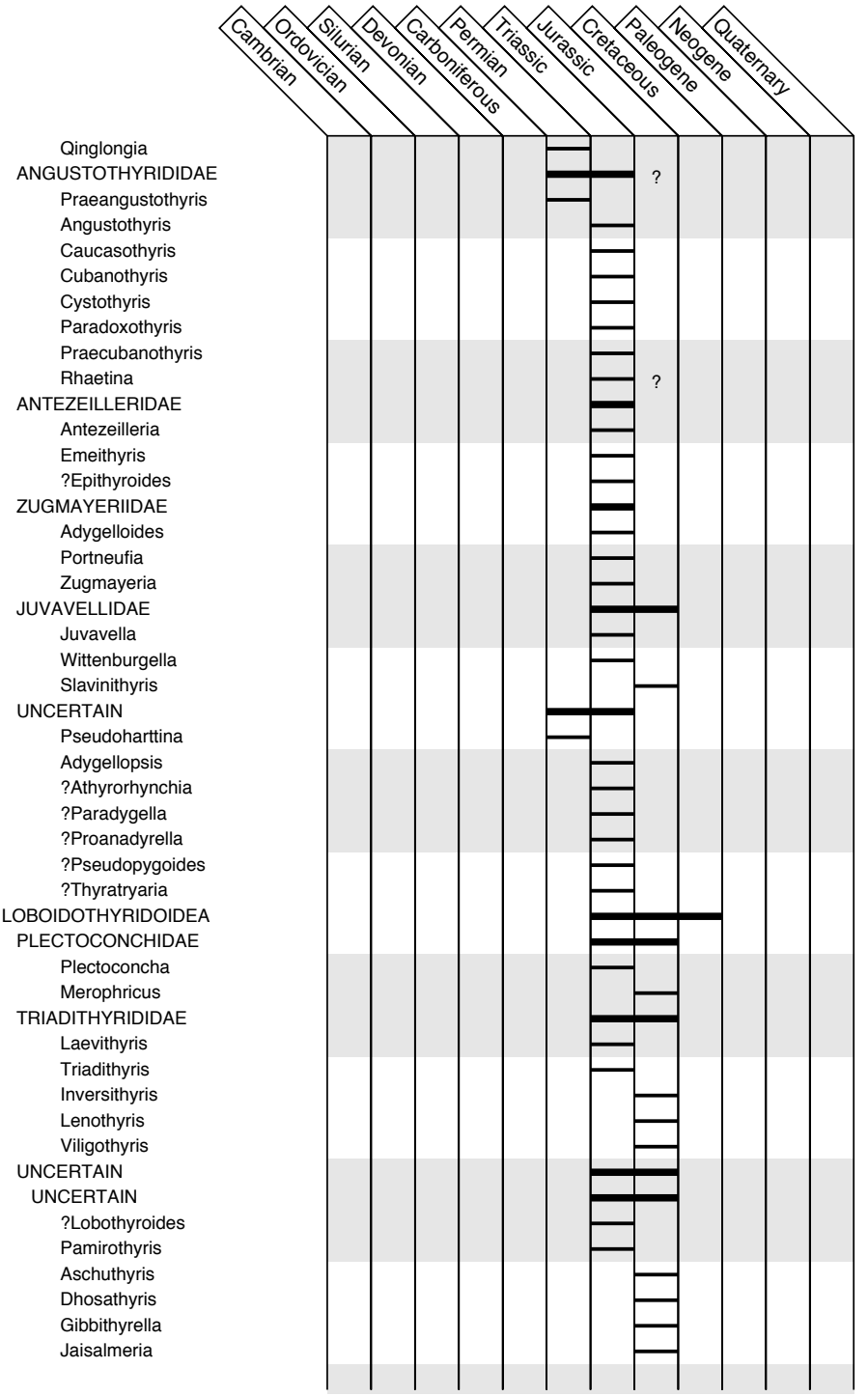

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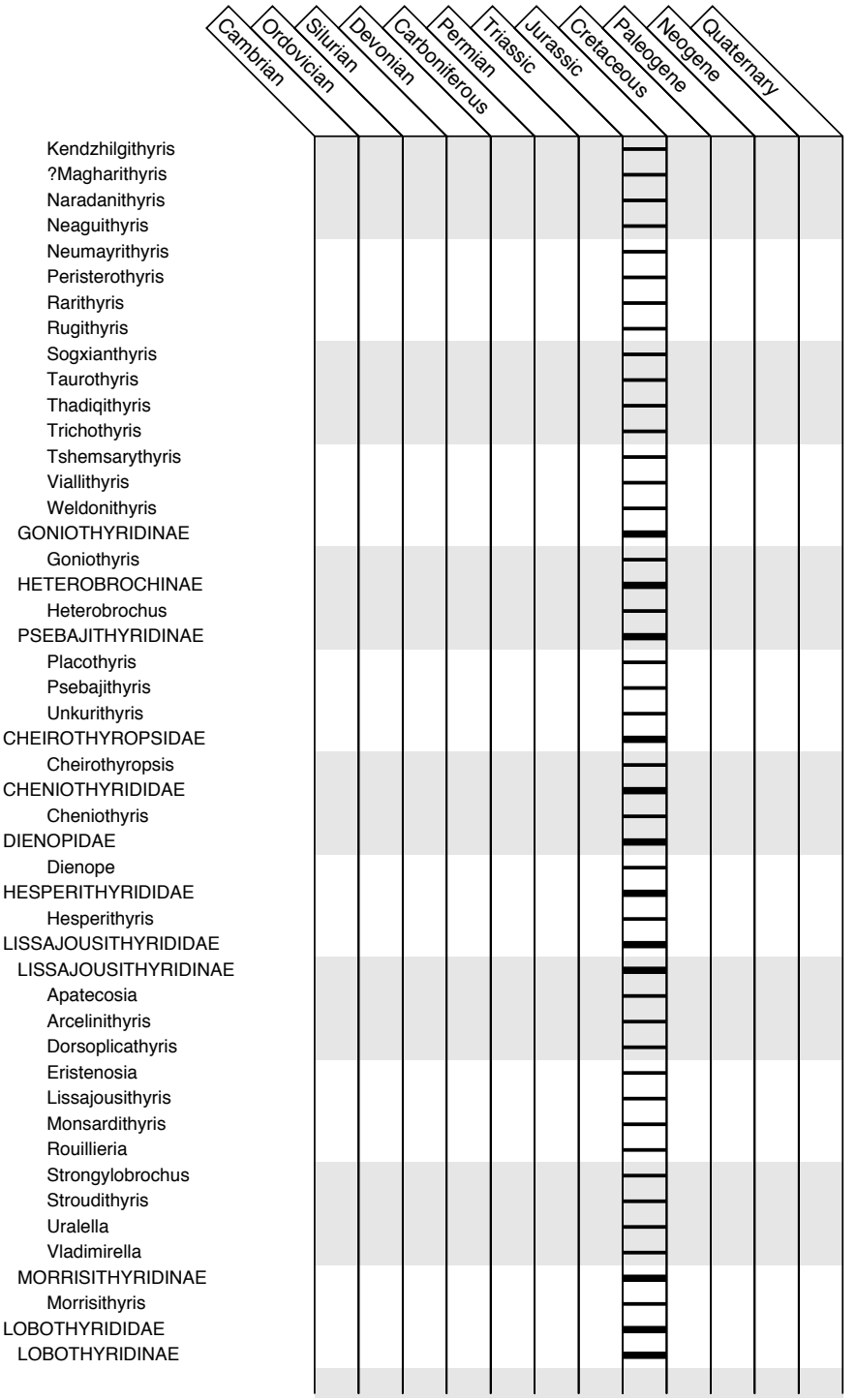

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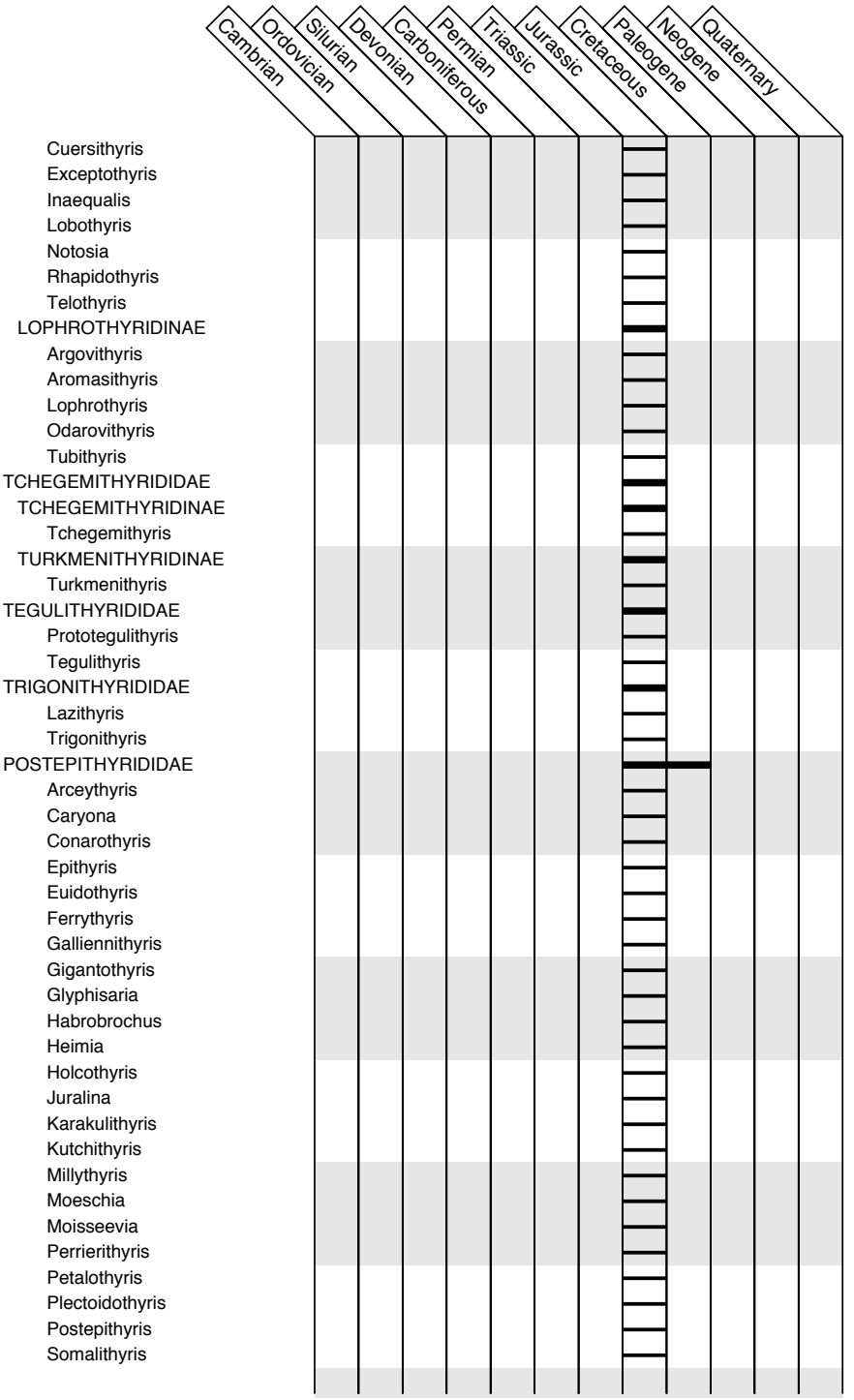

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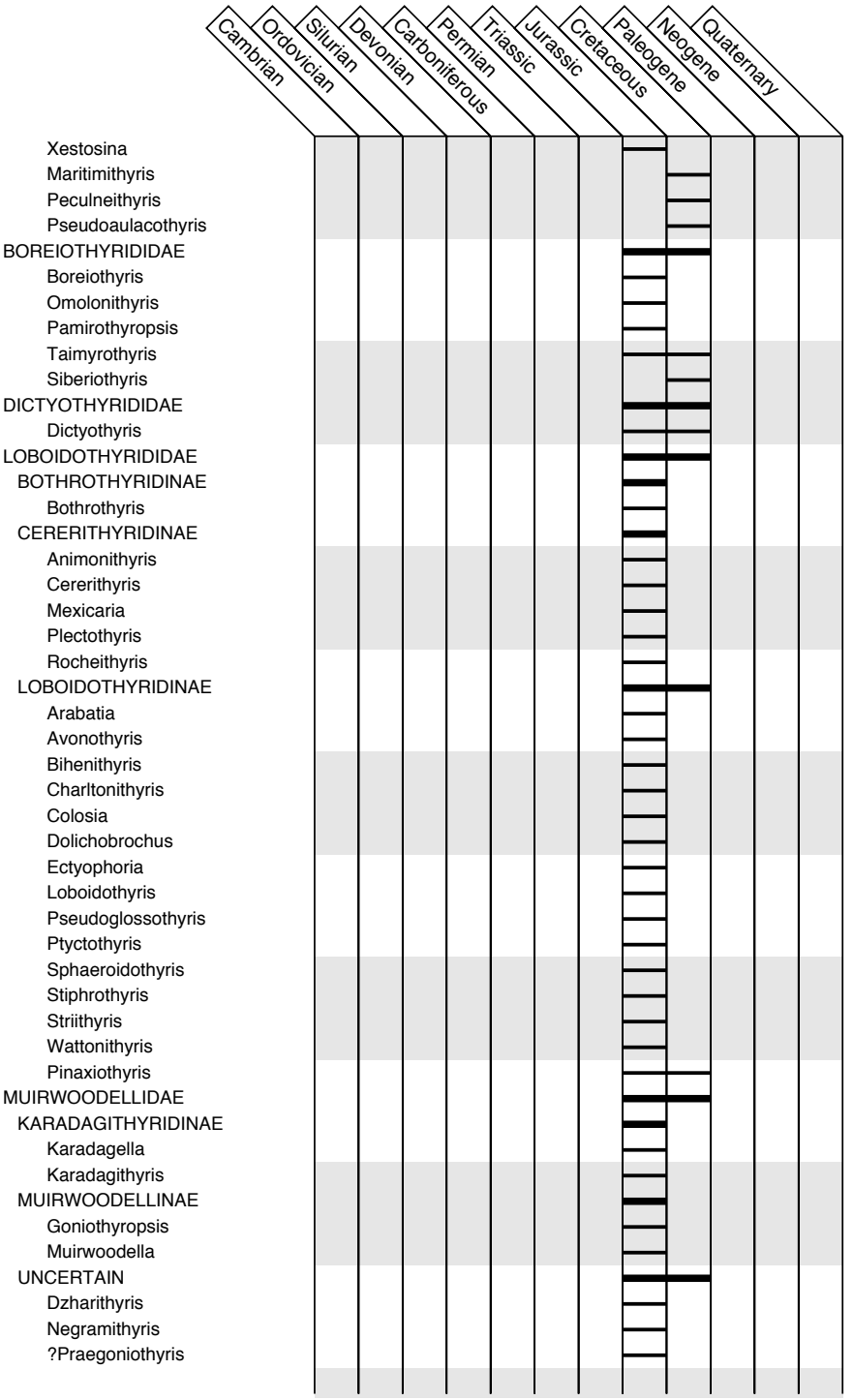

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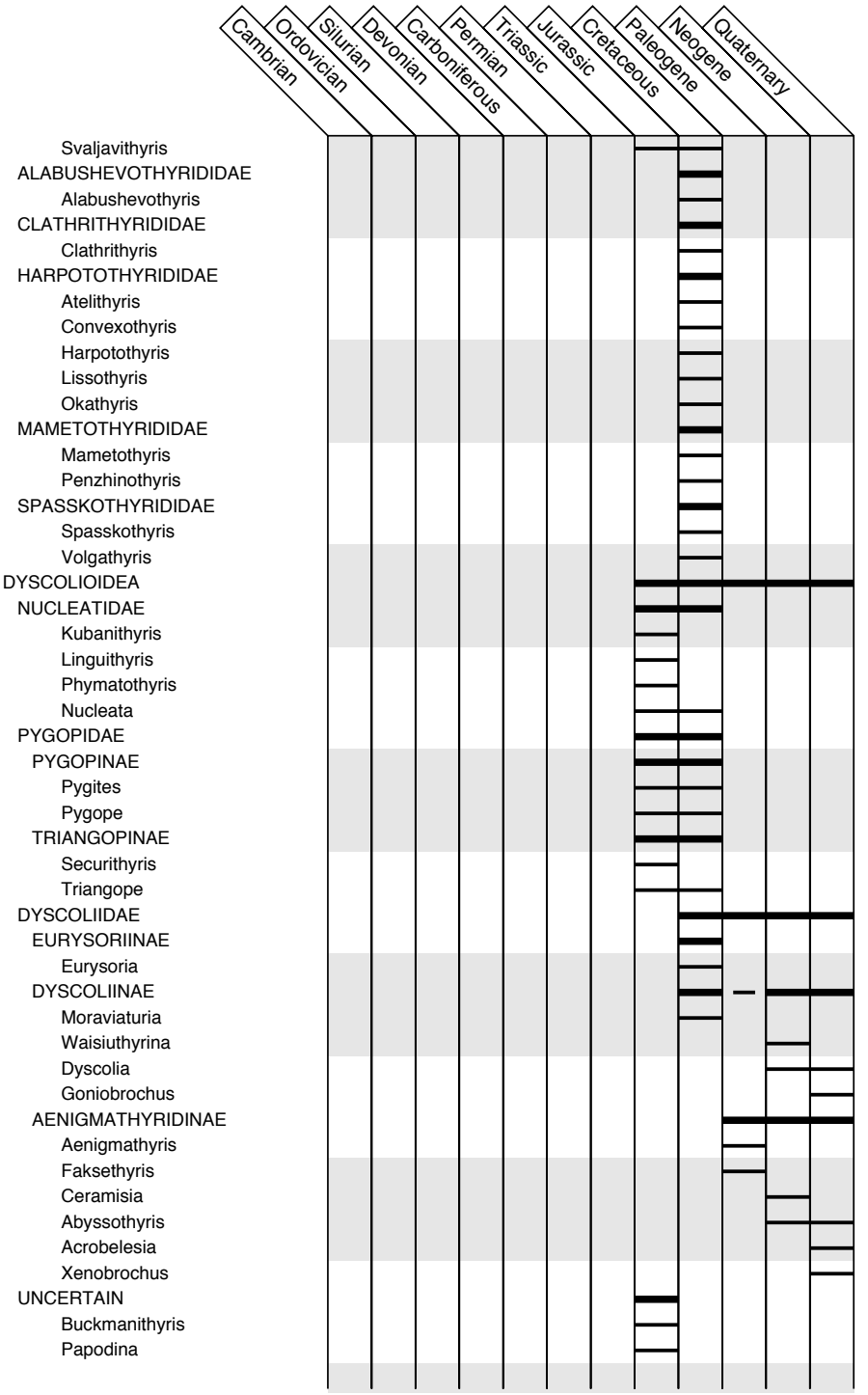

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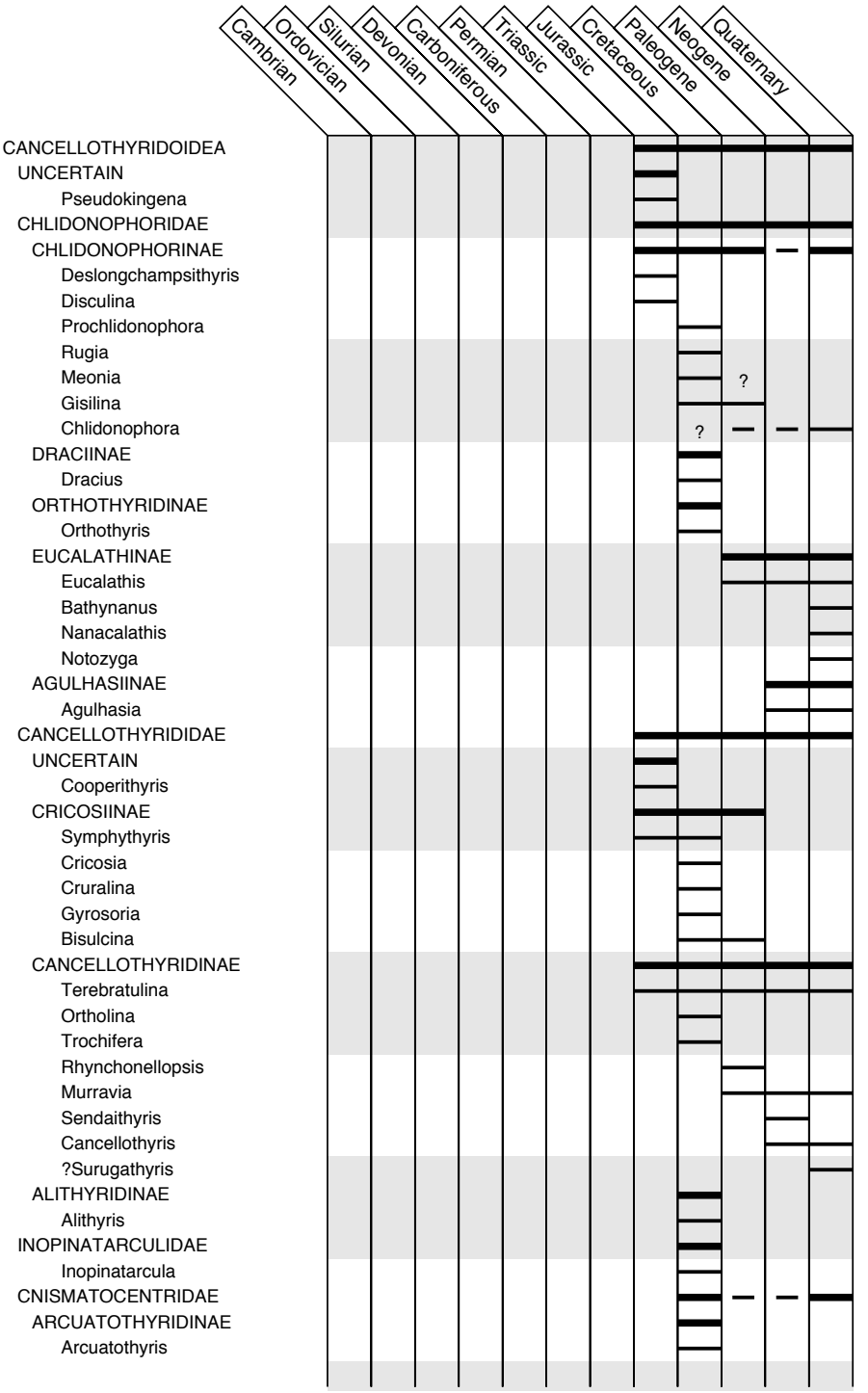

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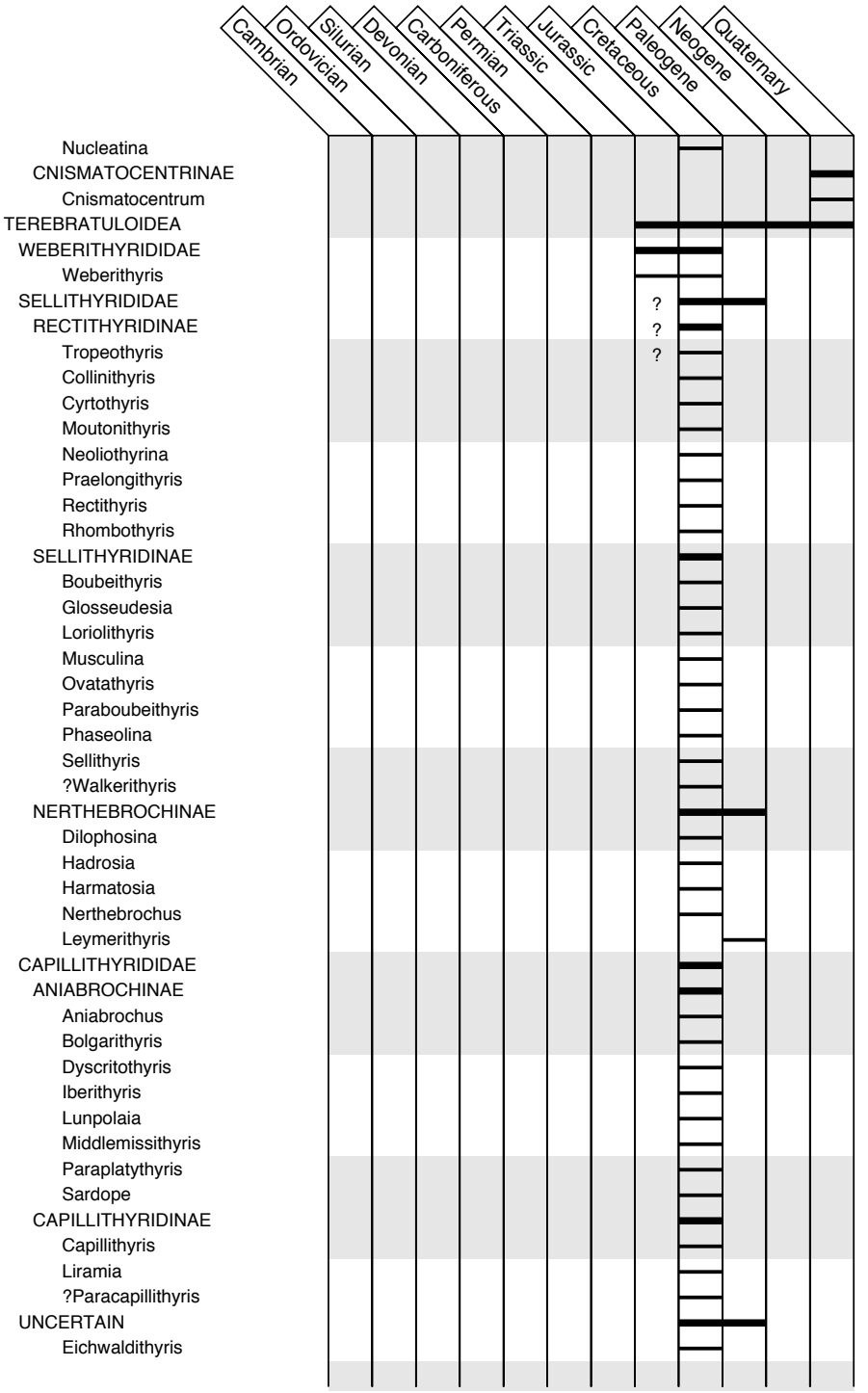

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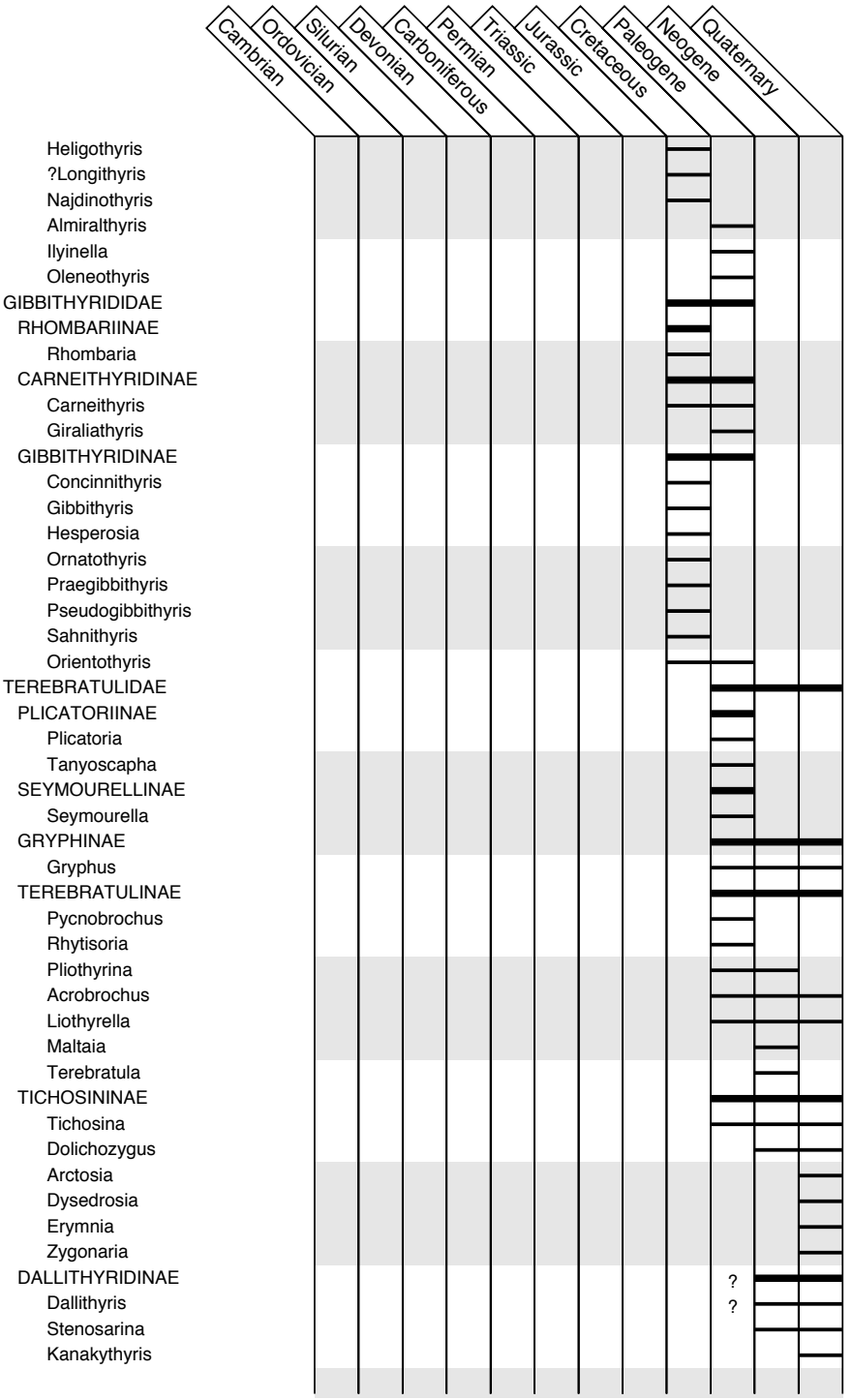

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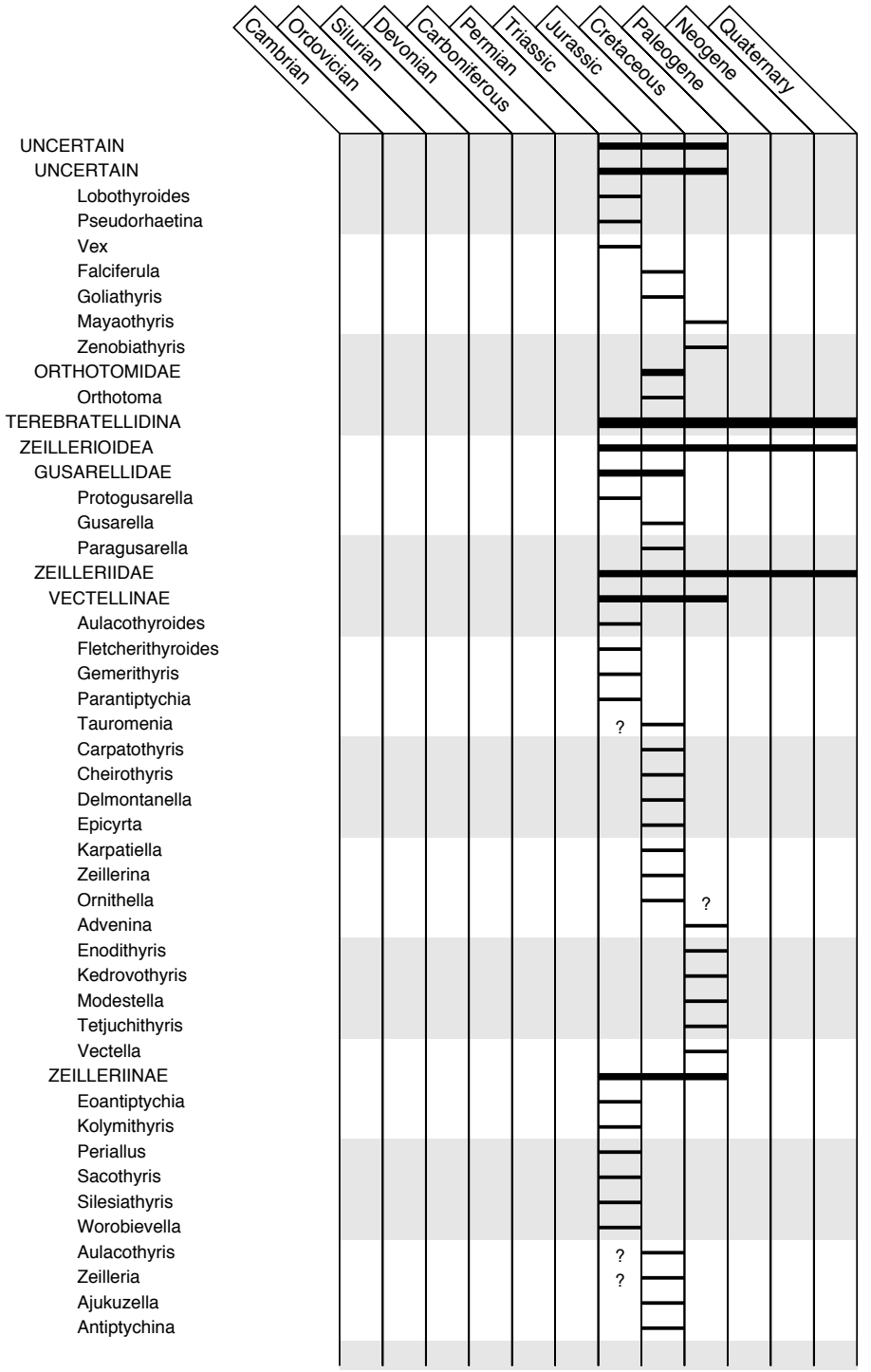

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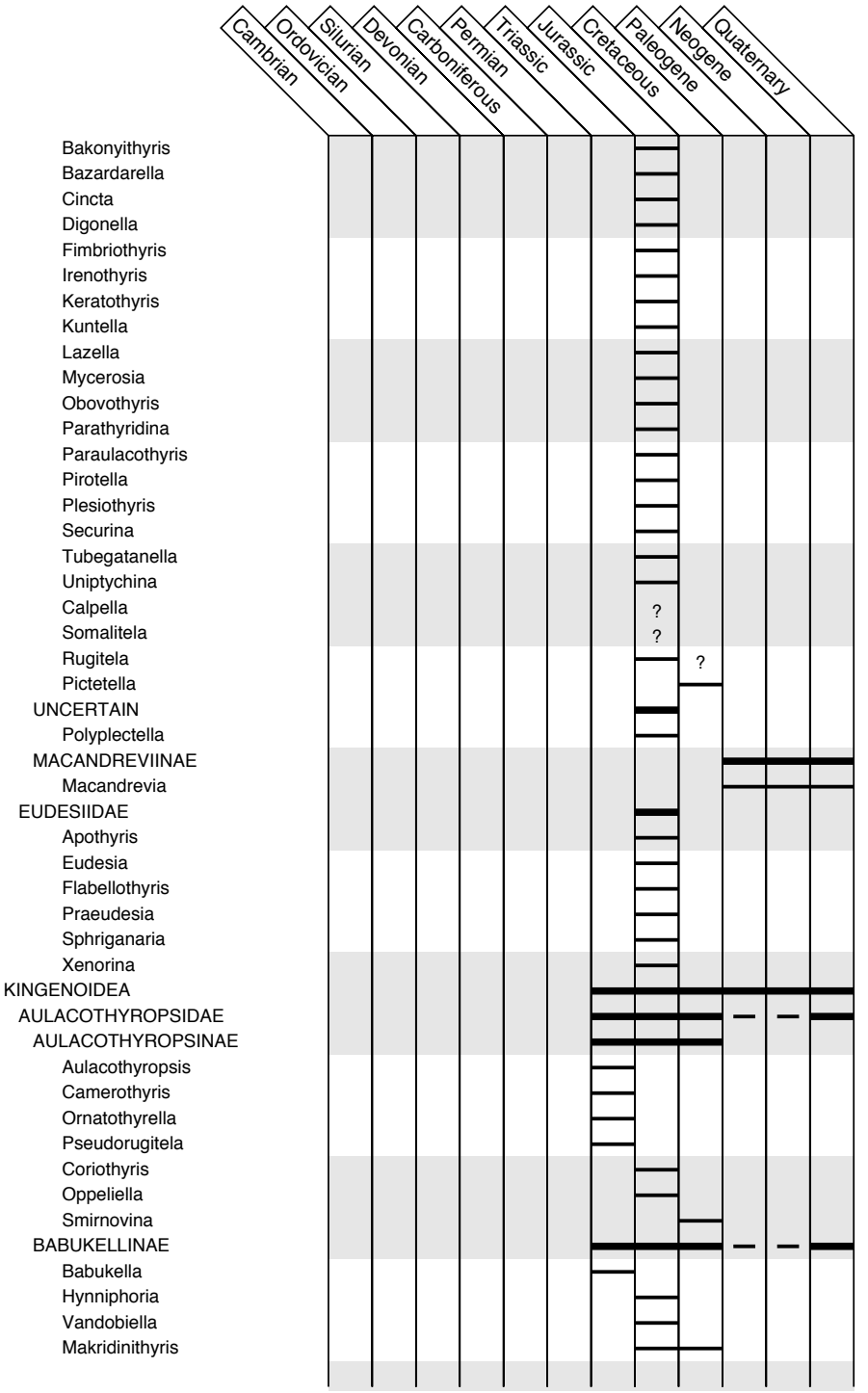

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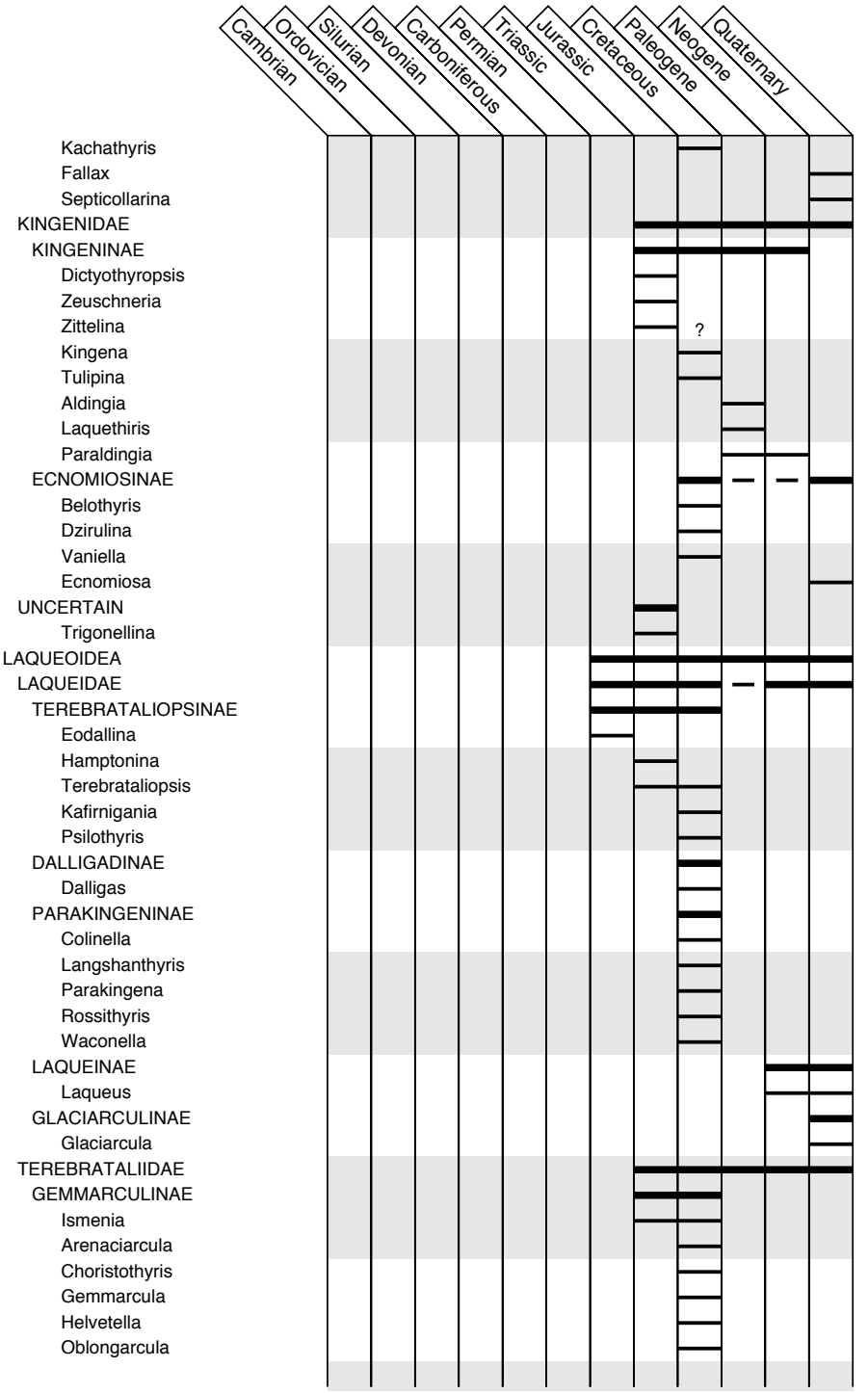

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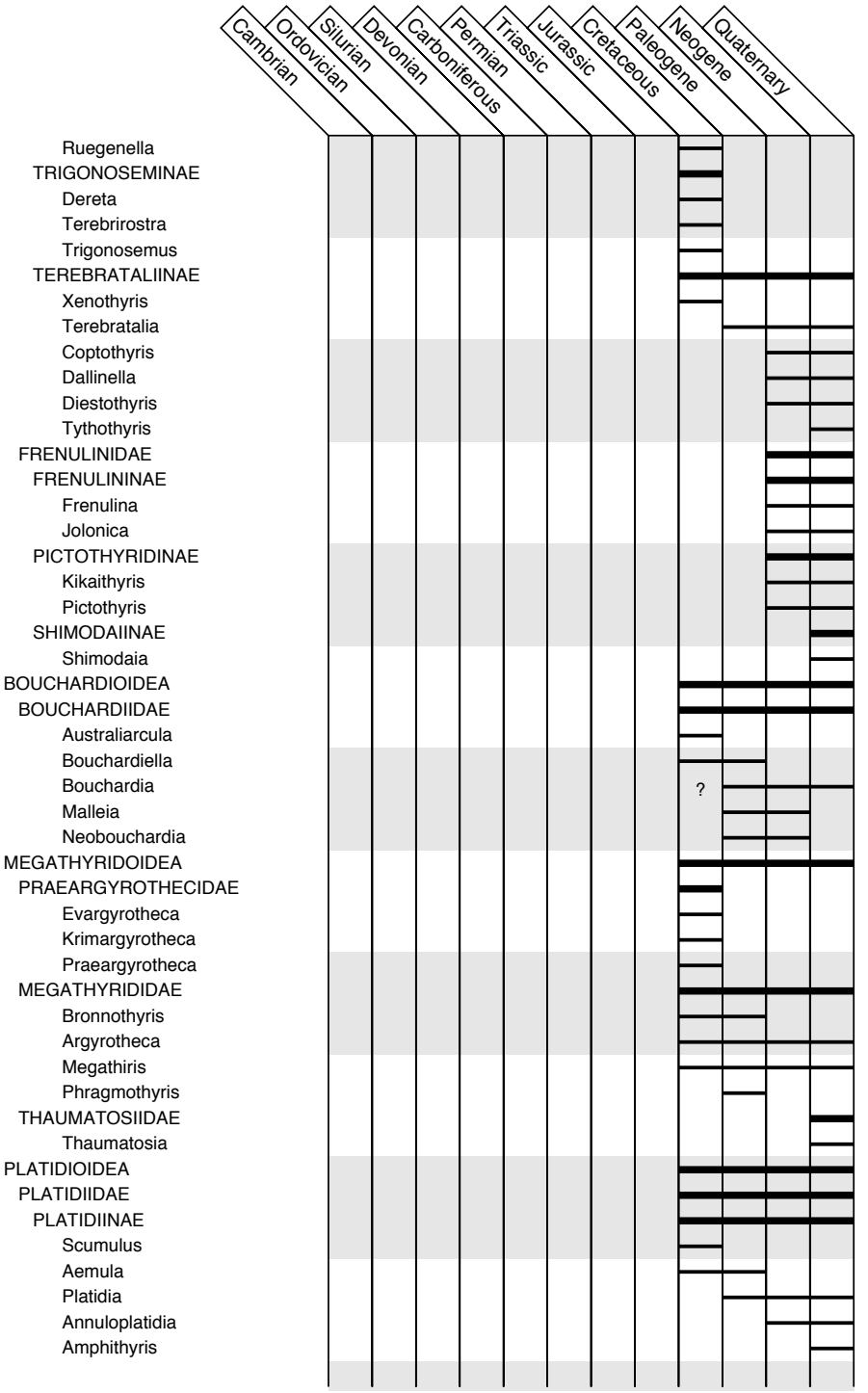

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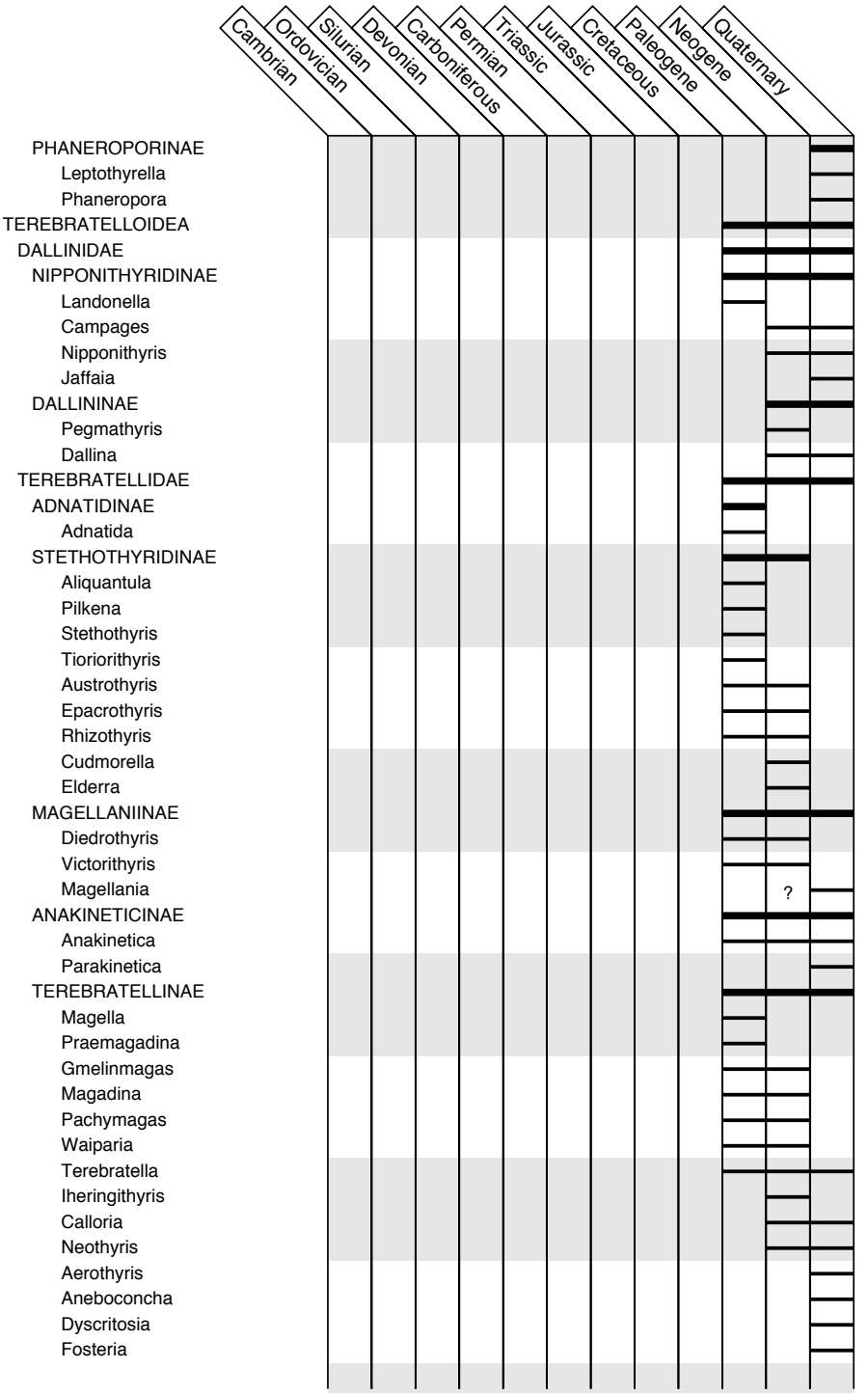

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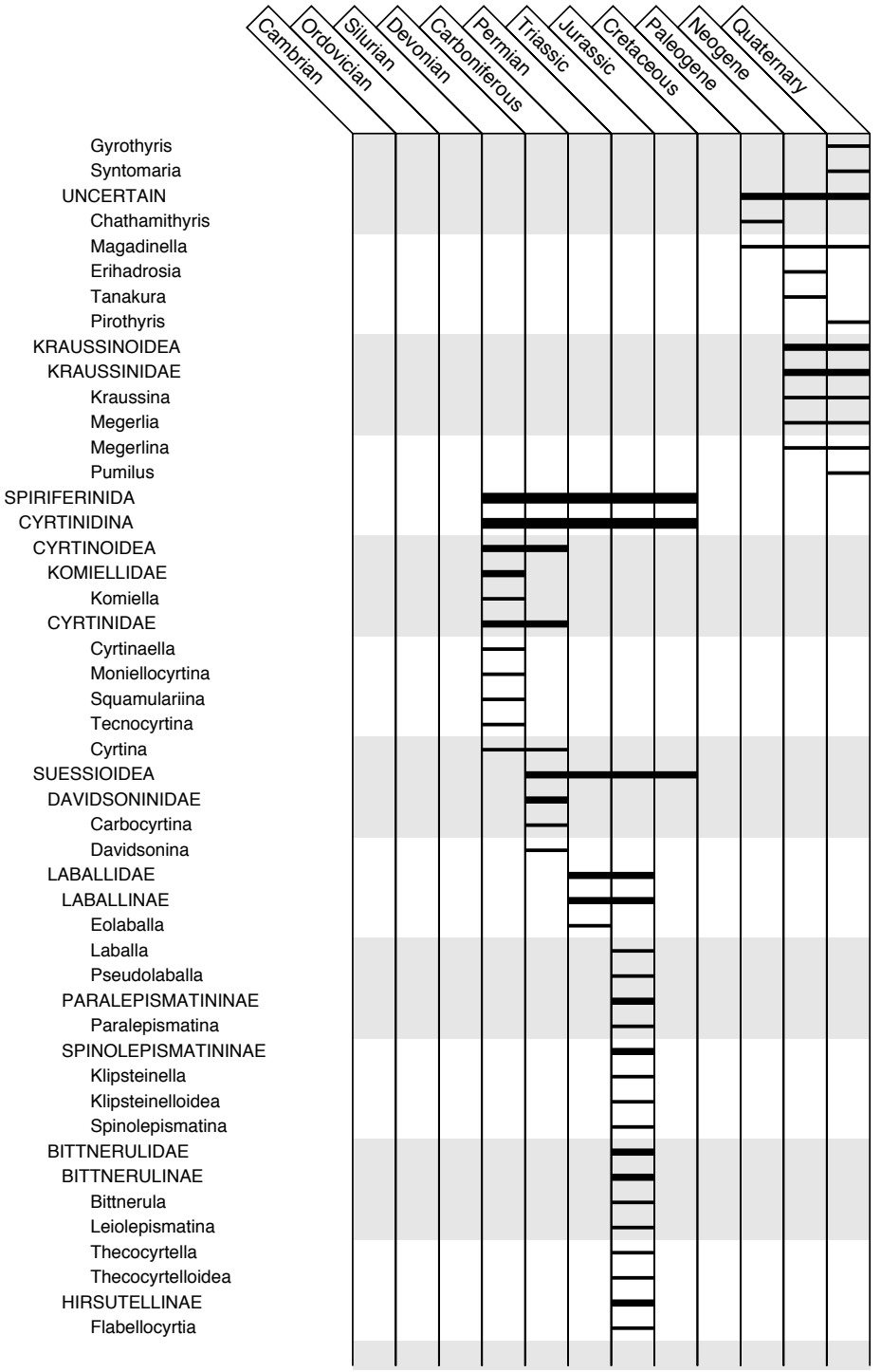

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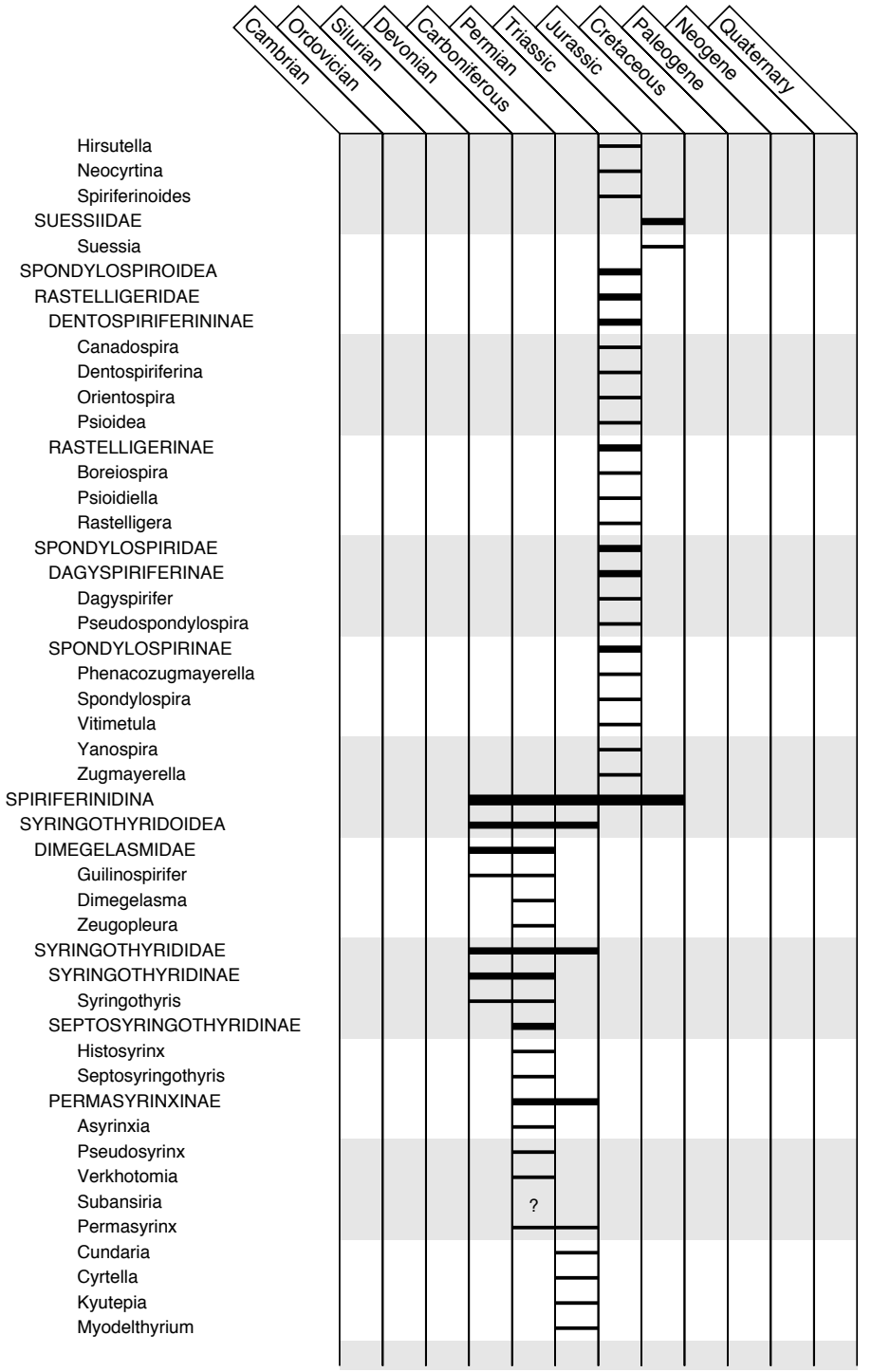

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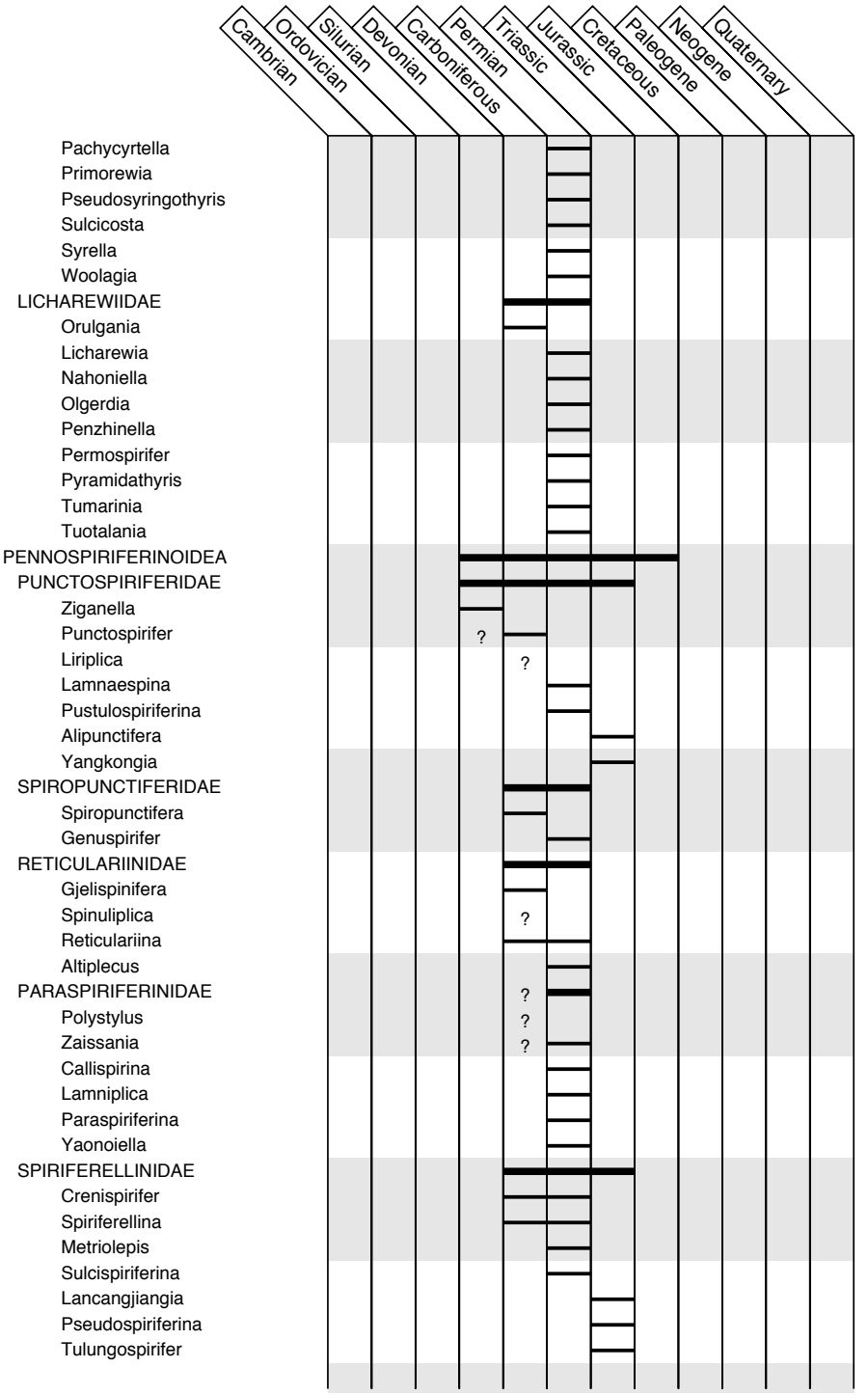

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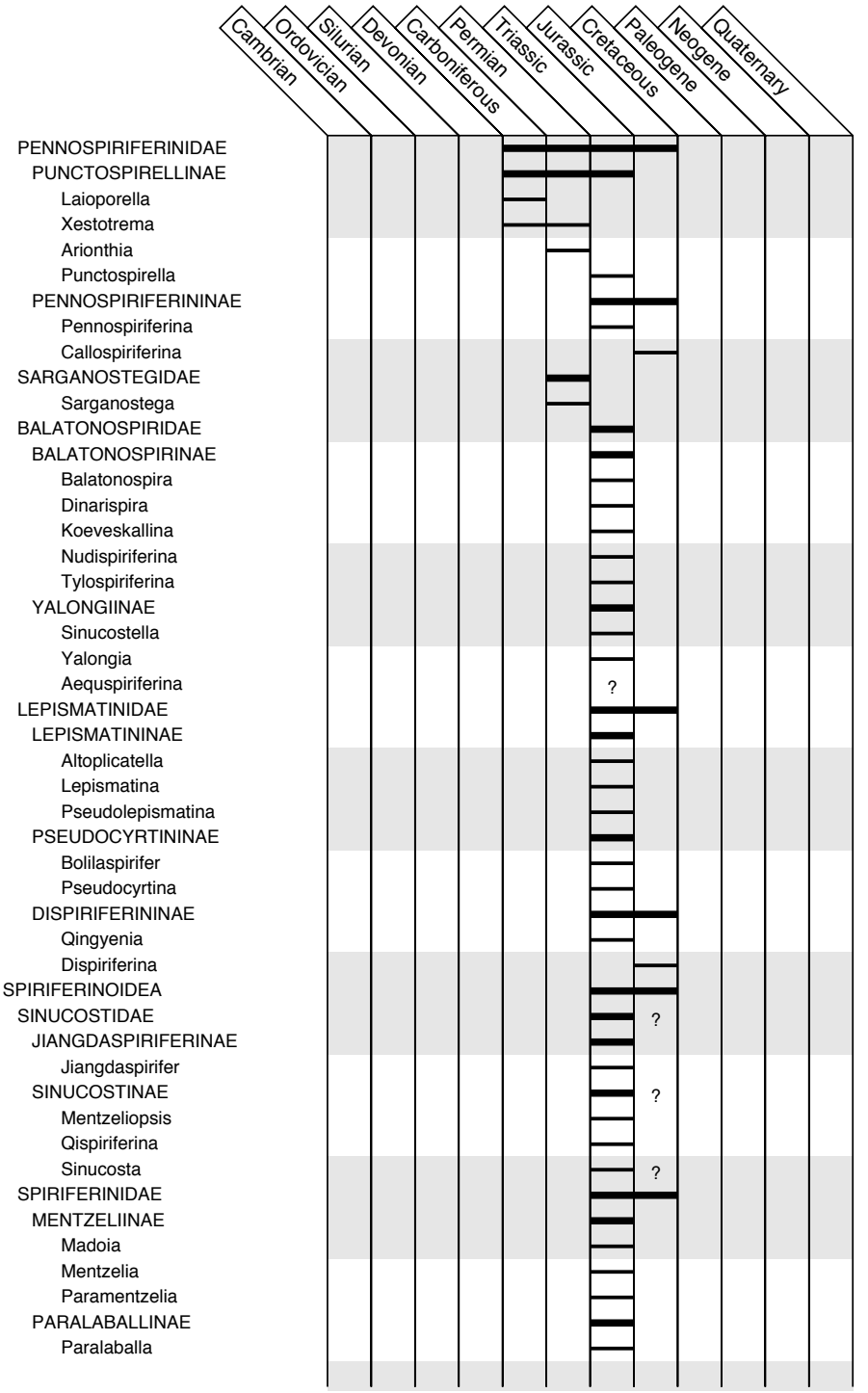

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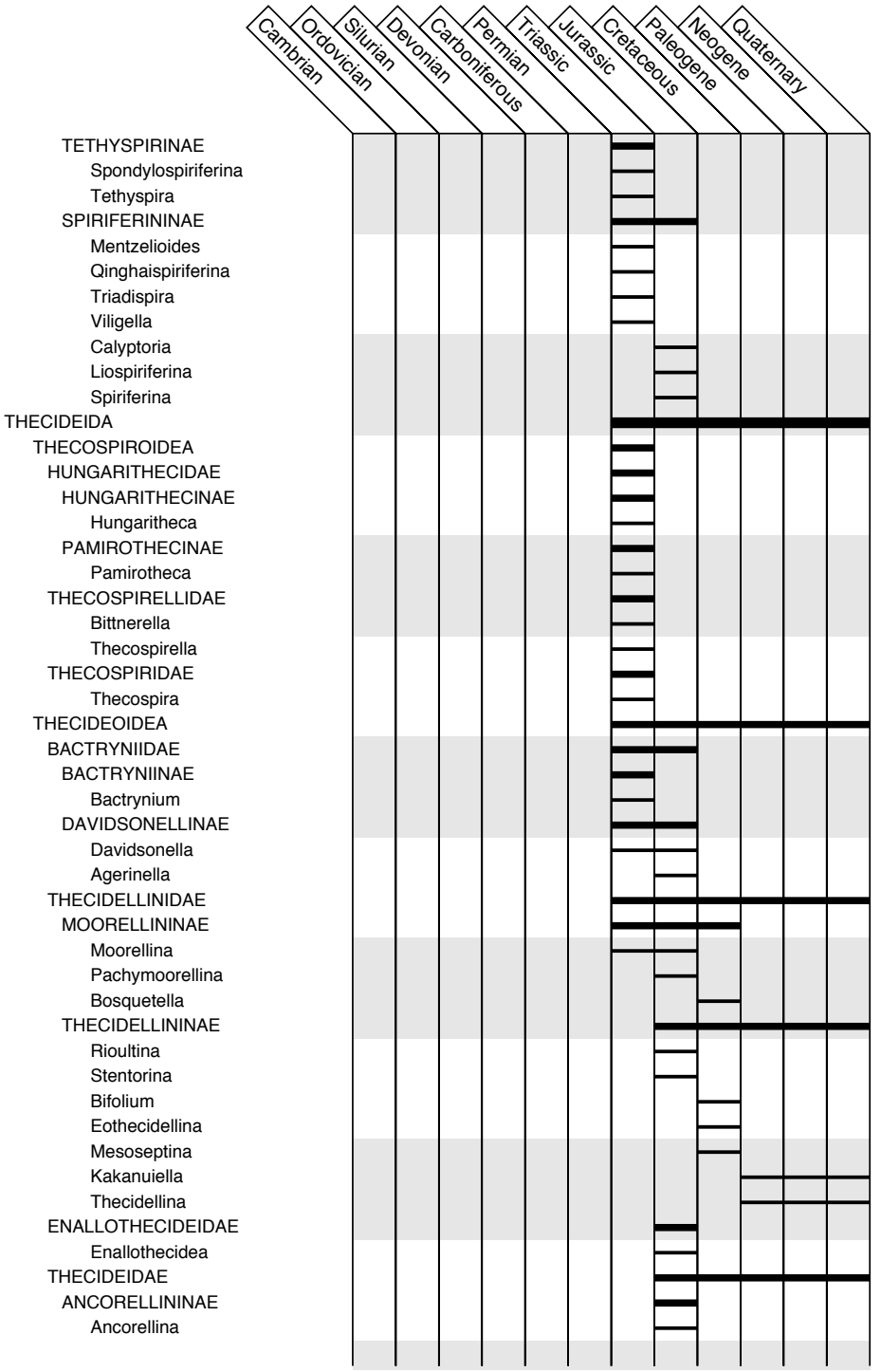

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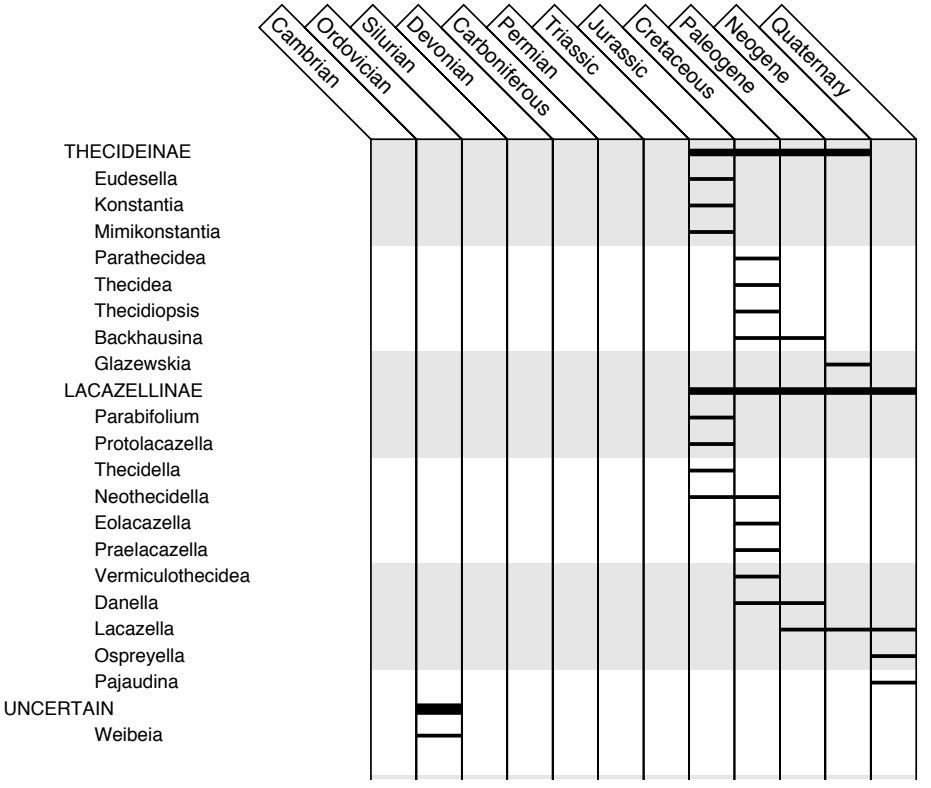

GEOGRAPHIC DISTRIBUTION OF EXTANT ARTICULATED BRACHIOPODS

ALAN LOGAN
[University of New Brunswick, Canada]

INTRODUCTION

Brachiopods were important members of the benthos of ancient seas, with over 5000 fossil genera known (WILLIAMS, 1996). They reached their acme of evolutionary development in the Paleozoic, but their importance, as measured by diversity, diminished drastically at the beginning of the Mesozoic, following the end-Permian extinction event that affected them greatly. Since then their numbers have stabilized, but today they remain a minor phylum, reduced to 336 extant species belonging to 100 genera. Nevertheless, they are widely distributed geographically, range greatly in depth, and are sometimes the dominant benthos in areas where competition for resources with other benthos may be reduced. Recent discoveries of new taxa have come from areas where accessibility and sampling is difficult (e.g., submarine caves, abyssal substrates), or where exploration and collecting has been limited. In this respect, little has yet been obtained from the Red Sea–Gulf of Aden (but see LOGAN & others, 2007) and Persian Gulf–Gulf of Oman areas or the shallow waters around northern Europe and Scandinavia, particularly the North Sea and Baltic Sea, although some of these areas are floored mainly by sediments, an environment generally inimical to articulated brachiopods.

Although many early taxonomic studies on articulated brachiopods (e.g., DAVIDSON, 1886–1888; FISCHER & OEHLERT, 1891; DALL, 1920) mentioned aspects of biogeography, the first work devoted to the subject was by SCHUCHERT (1911). This was followed by ELLIOTT's (1951) study on the geographical distribution of the then superfamily Terebratellacea, in which he recognized three distributional classes: a worldwide group, a northern hemisphere group, and a southern hemisphere group. Surprisingly, there was little mention of biogeography in the first edition of Part H (Brachiopoda) of the *Treatise on Invertebrate Paleontology* (MOORE, 1965). The biogeography of extant articulated brachiopods was subsequently treated in detail by ZEZINA (1976a,1985, 2001a) and RICHARDSON (1997b), with particular regard to physical and biological factors governing their distribution as well as their family origins and dispersal paths, topics that need not be repeated here. RICHARDSON (1997b) followed ELLIOTT (1951) in recognizing similar general distributional patterns for extant articulated brachiopods at the family level, noting that terebratellids occur exclusively in the southern hemisphere, laqueids are predominantly northern Pacific, and all other families are worldwide in distribution. Examples of other publications that have touched upon articulated brachiopod biogeography, either by genus, group, or region, include MUIR-WOOD (1959: Indian Ocean), FOSTER (1969: Antarctic–New Zealand), LOGAN (1979; LOGAN & others, 2004: Mediterranean Sea), BRUNTON & CURRY (1979: Britain), DAWSON (1991: New Zealand), LEE (1991: New Zealand), RICHARDSON (1994: Terebratellinae), ZEZINA (1997a: bathyal zone; 1997b: Arctic seas), BITNER and CAHUZAC (2004: *Cryptopora*), and ALVAREZ and EMIG (2005: Iberia and the Balearic Islands).

The present work updates that of ZEZINA (1985) and supplements that of RICHARDSON (1997b) by documenting the geographic distribution, depth ranges, and selected primary references (see References, p. 3116) for 336 extant articulated brachiopod species belonging to 100 genera (Tables 44–58), including those belonging to the superfamilies Pugnacoidea, Dimerelloidea, Norelloidea, Hemithiridoidea, Terebratuloidea,

TABLE 42. Depth ranges of species within superfamilies of extant articulated brachiopods (new).

Superfamily	# of species	0–500 neritic only	0–2000 neritic-upper bathyal	0–4000 neritic-lower bathyal	0–4000+ neritic-abyssal	500–4000 bathyal only	500–4000+ bathyal-abyssal	4000+ abyssal only	No depth data
Pugnacoidea	11	4	6	1	0	0	0	0	
Dimerelloidea	7	3	2	1	1	0	0	0	
Norelloidea	14	4	2	3	0	3	1	1	
Hemithiridoidea	7	2	2	1	0	0	0	0	2
Thecideoidea	13	11	1	0	0	0	0	0	1
Terebratuloidea	55	20	22	3	0	10	0	0	
Dyscolioidea	15	2	7	1	0	4	1	0	
Cancellothyridoidea	51	14	16	4	1	12	1	1	2
Zeillerioidea	10	0	1	2	1	5	1	0	
Kingenoidea	7	2	3	0	0	2	0	0	
Laqueoidea	37	27	9	1	0	0	0	0	
Megathyridoidea	25	18	7	0	0	0	0	0	
Bouchardioidea	1	1	0	0	0	0	0	0	
Platidioidea	16	6	3	2	2	3	0	0	
Terebratelloidea	48	28	15	1	0	1	0	0	3
Kraussinoidea	17	13	4	0	0	0	0	0	
Gwynioidea	2	0	2	0	0	0	0	0	
Totals	336	155	102	20	5	40	4	2	8
Percentage		46.1	30.4	6.0	1.5	11.9	1.2	0.6	2.4

Dyscolioidea, and Cancellothyridoidea, which were not included in RICHARDSON (1997b). The classification scheme of WILLIAMS, CARLSON, and BRUNTON (2002) adopted by SAVAGE and others (2002) for the Rhynchonellida and LEE and others (2006) for the Terebratulida is followed. The geographic distribution of each genus has also been plotted on world maps (Fig. 1939–1960) to accompany the tables.

The latitudinal distribution of the articulated brachiopods was discussed by RUDWICK (1977), who showed that they are most abundant in temperate latitudes in both hemispheres. Bathymetric ranges of Recent brachiopods have been discussed by ZEZINA (1970, 1976a), COOPER (1977), EMIG (1988), and RICHARDSON (1997b), most of whom have concluded that they make poor analogs for paleobathymetric reconstructions because of their great depth ranges. The depth ranges for individual species of articulated brachiopods are shown in Tables 44–58, and those for the extant articulated brachiopods as a whole are shown in Table 42. For the purpose of describing the depth range of species, the neritic zone is here recognized as extending from low tide to 500 m, the bathyal zone from 500–4000 m (with the upper bathyal zone from 500–2000 m and the lower bathyal zone from 2000–4000 m), and the abyssal zone from 4000 m to the greatest depths recorded in the oceans. ZEZINA (1970) maintained that the majority of brachiopods (including the inarticulated forms) occur within the neritic zone, and this is supported by an analysis of the depth data for the articulated brachiopods here (Table 42), with 46% of species found only in this zone and a further 30% found in the neritic zone but not restricted to it, ranging down into the upper bathyal zone. A further 6% range from 500–2000 m, bringing the total for species found in the neritic and upper bathyal zones to over 80%. The rest are found either in the lower bathyal zone or the abyssal zone. Only the Terebratuloidea, Cancellothyridoidea, and Zeillerioidea have significant numbers of deep-water species. For articulated species as a whole, only 9

TABLE 43. List of superfamilies and extant genera of articulated brachiopods documented in this chapter (new).

Superfamily (Number of genera)	Genera
Pugnacoidea (5)	*Basiliola, Basiliolella, Rhytirhynchia, Acanthobasiliola, Striarina*
Dimerelloidea (2)	*Cryptopora, Aulites*
Norelloidea (9)	*Frieleia, Compsothyris, Grammetaria, Hispanirhynchia, Abyssorhynchia, Manithyris, Parasphenarina, Neorhynchia, Tethyrhynchia*
Hemithiridoidea (3)	*Hemithiris, Pemphyxina, Notosaria*
Thecideoidea (5)	*Lacazella, Pajaudina, Ospreyella, Thecidellina, Kakanuiella*
Terebratuloidea (12)	*Acrobrochus, Liothyrella, Gryphus, Tichosina, Arctosia, Dolichozygus, Dysedrosia, Erymnia, Zygonaria, Dallithyris, Kanakythyris, Stenosarina*
Dyscolioidea (5)	*Dyscolia, Goniobrochus, Abyssothyris, Acrobelesia, Xenobrochus*
Cancellothyridoidea (10)	*Cancellothyris, Murravia, Terebratulina, Chlidonophora, Eucalathis, Bathynanus, Nanacalathis, Notozyga, Agulhasia, Cnismatocentrum*
Zeillerioidea (1)	*Macandrevia*
Kingenoidea (3)	*Ecnomiosa, Fallax, Septicollarina*
Laqueoidea (12)	*Laqueus, Glaciarcula, Frenulina, Jolonica, Pictothyris, Shimodaia, Terebratalia, Coptothyris, Dallinella, Diestothyris, Simplicithyris, Tythothyris*
Megathyridoidea (3)	*Megathiris, Argyrotheca, Thaumatosia*
Bouchardioidea (1)	*Bouchardia*
Platidioidea (5)	*Platidia, Amphithyris, Annuloplatidia, Leptothyrella, Neoaemula*
Terebratelloidea (19)	*Terebratella, Aerothyris, Aneboconcha, Calloria, Dyscritosia, Fosteria, Gyrothyris, Neothyris, Syntomaria, Anakinetica, Parakinetica, Magellania, Holobrachia, Magadinella, Pirothyris, Dallina, Nipponithyris, Campages, Jaffaia*
Kraussinoidea (4)	*Kraussina, Megerlia, Megerlina, Pumilus*
Gwynioidea (1)	*Gwynia*

species belonging to 9 genera are known to extend below 4000 m into the abyssal zone. These are: *Cryptopora gnomon, Abyssorhynchia craneana, Neorhynchia strebeli, Abyssothyris wyvillei, Terebratulina kiiensis, Chlidonophora incerta, Bathynanus inversus, Annuloplatidia indopacifica,* and *Leptothyrella incerta. N. strebeli* is the only species so far found only in the abyssal zone. The greatest known depth for living shells is 5800 m for *Annuloplatidia indopacifica,* and the greatest recorded depth range is 370–5800 m for the same species (ZEZINA, 1985).

ORDER RHYNCHONELLIDA

The superfamilies and their genera documented here are listed in Table 43. The order Rhynchonellida contains 4 superfamilies with extant genera (SAVAGE & others, 2002). These superfamilies are the Pugnacoidea, Dimerelloidea, Norelloidea, and Hemithiridoidea. While rhynchonellide species are relatively uncommon in modern seas, 39 Recent species belonging to 18 genera have so far been described (Tables 44–47; Fig. 1939–1942). The geological ranges of all extant rhynchonellide genera may be found in SAVAGE and others (2002).

PUGNACOIDEA

The superfamily Pugnacoidea contains 11 extant species belonging to 5 genera (Table 44, Fig. 1939). All species have a relatively restricted depth range within the neritic and upper bathyal zones, with the exception of *Basiliola pompholyx*, which has been found below 2000 m. Geographically, living pugnacoids are Indo-Pacific in distribution, with particular concentration in the western Pacific; they are not represented in the Atlantic or from polar latitudes. *Basiliolella* is found in an arc from eastern Australia to the Loyalty Islands and New Caledonia. Three of the genera are monotypical, with *Rhytirhynchia* and *Striarina* found only in the central Indian Ocean, while *Acanthobasiliola* occurs from Japan to the Banda Sea.

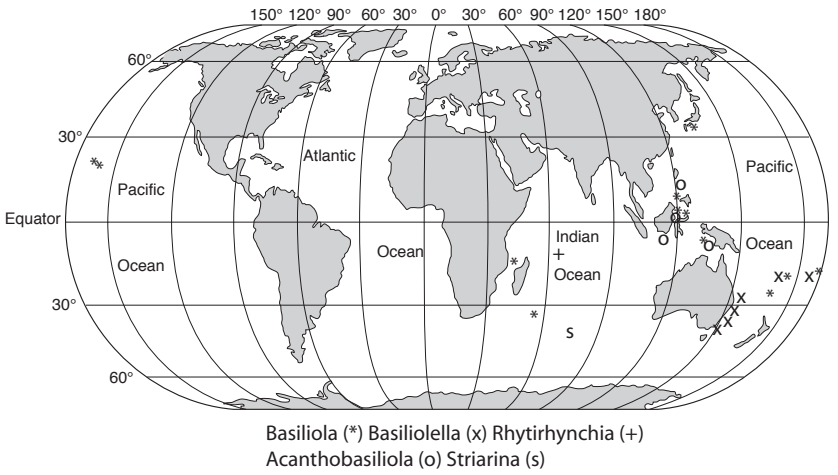

FIG. 1939. Geographic distribution of extant articulated brachiopod genera in superfamily Pugnacoidea (new).

TABLE 44. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Pugnacoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Basiliola Dall, 1908	5	250–380	*B. arnaudi* Cooper, 1981a: Indian Ocean: N. Moçambique Channel; Samper Bank, SE of Madagascar (Cooper, 1981a; Zezina, 1987)
		260–735	*B. beecheri* (Dall, 1895): Pacific Ocean: Hawaiian Is., New Caledonia and Loyalty Is., Fiji; Norfolk Ridge (Dall, 1895, 1920; Cooper, 1959; Zezina, 1981b, 2005; Laurin,1997; Bitner, 2006)
		44–981	*B. elongata* Cooper, 1959: Pacific Ocean: S. Philippines, Celebes, ?Kei Is. (Dall, 1920; Cooper, 1959)
		80–520	*B. lucida* (Gould, 1862): Pacific Ocean: Japan; New Caledonia and Loyalty Is. (Davidson, 1887 in 1886–1888; Dall, 1920; Hatai, 1936a, 1940; Cooper, 1959; Laurin, 1997)
		275–2009	*B. pompholyx* Dall, 1920: Pacific Ocean: Philippines, Borneo, Kei Is. (Dall, 1920; Jackson & Stiasny, 1937; Cooper, 1959; Zezina, 1981a)
Basiliolella d'Hondt, 1987	3	181–300	*B. colurnus* (Hedley, 1905): Pacific Ocean: Australia, eastern coast from 28° S to eastern Bass Strait at 40° S (Dall, 1920; Zezina, 1981a, 1985)
		210–250	*B. ferox* d'Hondt, 1987: Pacific Ocean: New Caledonia and Loyalty Is. (d'Hondt, 1987)
		160–600	*B. grayi* (Woodward, 1855): Pacific Ocean: Fiji, New Caledonia, Loyalty Is. (Woodward, 1855; Laurin, 1997)
Rhytirhynchia Cooper, 1957	1	223–278	*R. sladeni* (Dall, 1910): Indian Ocean: S. of Saya de Malha Bank (Dall, 1910, 1920; Cooper, 1959)
Acanthobasiliola Zezina, 1981a	1	240–635	*A. doederleini* (Davidson, 1886 in 1886–1888): Pacific Ocean: Japan, Philippines, Celebes Sea, Banda Sea, Java Sea (Davidson, 1887 in 1886–1888; Dall, 1920; Jackson & Stiasny, 1937; Cooper, 1959; Zezina, 1981a)
Striarina Cooper, 1973	1	672	*S. valdiviae* (Helmcke, 1940): Indian Ocean: east of St. Paul Is. (Helmcke, 1940; Zezina, 1985)

DIMERELLOIDEA

The superfamily Dimerelloidea contains seven extant species belonging to two genera (Table 45, Fig. 1940). *Cryptopora* contains six extant species and is represented in all the oceans of the world and at virtually all latitudes. The biogeography and geological history of Recent and fossil species of this genus has been discussed by Bitner & Cahuzac (2004). Although widely distributed, *C. gnomon* is particularly well represented in the North Atlantic. Notwithstanding the wide depth range of both this species and its congener *C. boettgeri* from the Indo-Pacific, both are regarded as typically deep-water forms, with *C. gnomon* ranging down into the abyssal zone (Cooper, 1973d; Curry, 1983). *Cryptopora curiosa*, on the other hand, is a distinctive shallow-water species present in the Red Sea–Gulf of Aden area and northwestern Indian Ocean (Cooper, 1973b; Logan & others, 2007). The three remaining species are all neritic and upper bathyal zone dwellers. The genus *Aulites* is monotypical, with *A. brazieri* being restricted to the neritic zone of the eastern, southern, and western coasts of Australia (Richardson, 1987).

NORELLOIDEA

The superfamily Norelloidea contains 14 extant species belonging to 9 genera (Table 46, Fig. 1940–1941). *Parasphenarina* from the Indo–West Pacific and the monotypical *Tethyrhynchia* from the Mediterranean are both micromorphic forms that typically inhabit shallow-water caves (Logan & Zibrowius, 1994; Motchurova-Dekova &

Table 45. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Dimerelloidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Cryptopora Jeffreys, 1869	6	250–3045	*C. boettgeri* Helmcke, 1940: Atlantic Ocean–Indian Ocean: off Dar-es-Salaam, Tanzania; S. Africa; Pacific Ocean: New Caledonia; S. Australia (Helmcke, 1940; Foster, 1969; Cooper, 1973b, 1973d; d'Hondt, 1987; Hiller, 1991, 1994)
		50–1537	*C. curiosa* Cooper, 1973b: Indian Ocean: Andaman Is.; Mozambique; S. Africa; NE end of Somalia; Red Sea–Gulf of Aden (Cooper, 1973b; Hiller, 1994; Logan & others, 2007)
		300–4060 (5950?)	*C. gnomon* Jeffreys, 1869: Atlantic Ocean: Franz Josef Land; Barents Sea; Iceland; Norway; British Isles; G. of Gascogne; N. Spain; Morocco; Azores; Canary Is.; W. Greenland; Davis Strait; Labrador; Newfoundland; eastern Canada and USA to Florida; G. of Mexico; Caribbean: Bermuda, Panama; NE of Falkland Is.; Pacific: New Zealand, Macquarie Is. (Fischer & Oehlert, 1891; Dall, 1920; Massy, 1925; Wesenberg-Lund, 1938, 1939, 1940b, 1941; Cooper, 1954a, 1959, 1973d, 1981b; Zezina, 1975a, 1975b, 1981, 1997b, 2000, 2001a; Dawson, 1991; Bitner & Cahuzac, 2004; Alvarez & Emig, 2005)
		170	*C. hesperis* Cooper, 1982: Pacific Ocean: southern Oregon (Cooper, 1982)
		927	*C. maldiviensis* Muir-Wood, 1959: Indian Ocean: Maldive Is., (Muir-Wood, 1959)
		136–850	*C. rectimarginata* Cooper, 1959: Caribbean Sea: G. of Mexico; Florida Keys; Bahamas; Saba Bank; Barbados (Cooper, 1959, 1977; Asgaard & Stentoft, 1984; Logan, 1990)
Aulites Richardson, 1987	1	34–228	A. *brazieri* (Crane, 1886): Pacific Ocean: eastern, southeren, and western coasts of Australia between 23°–39° S and 113°–154° E (Hedley, 1906; Dall, 1920; Foster, 1969; Richardson, 1987)

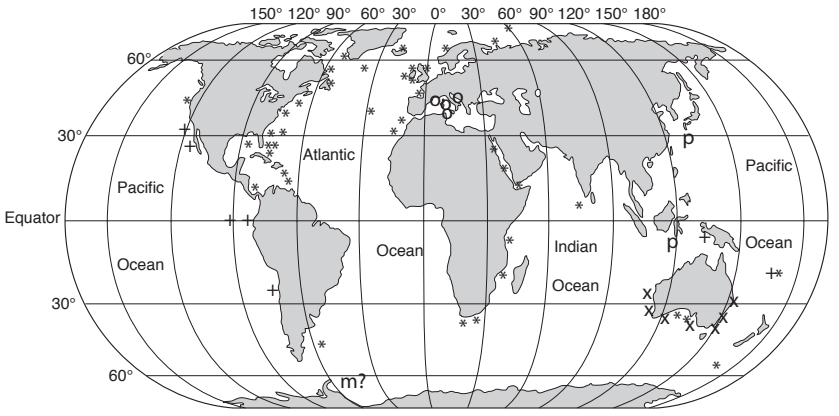

FIG. 1940. Geographic distribution of extant articulated brachiopod genera in superfamilies Dimerelloidea and Norelloidea (part) (new).

others, 2002). Both species of *Grammetaria* are also relatively shallow, but all other norelloid genera show most of their species ranging down into the bathyal, and, in the case of *Abyssorhynchia* and *Neorhynchia*, the abyssal zone. Geographically the group is widespread. *Manithyris* and *Compsothyris* are typically deep-water forms off Antarctica, while *Frieleia* occurs north of 30° N on both sides of the Pacific Ocean. *Grammetaria* is more widespread longitudinally than latitudinally, its geographic range stretching from Cape of Good Hope to Indonesia and as far east as the Loyalty Islands and New Caledonia. In contrast, *Hispanirhynchia cornea* is common only off the eastern Atlantic coasts and northwestern Africa. *Abyssorhynchia* is a central and eastern Pacific form, while *Neorhynchia* occurs in the western Pacific around New Guinea and New Caledonia and along the eastern Pacific seaboard for over 60° of latitude.

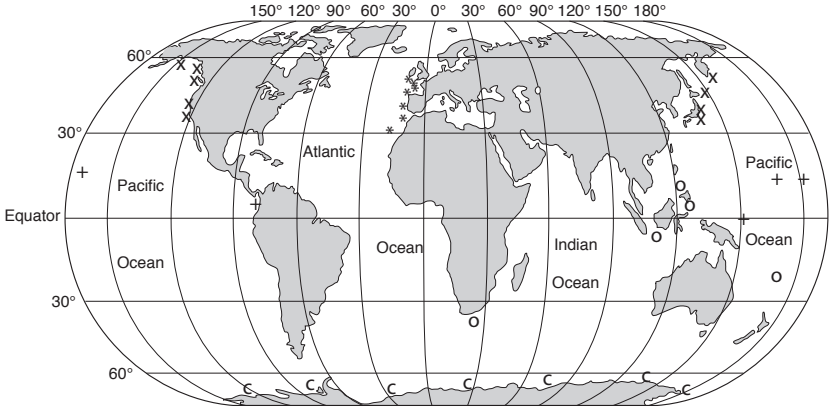

FIG. 1941. Geographic distribution of extant articulated brachiopod genera in superfamily Norelloidea (part) (new).

TABLE 46. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Norelloidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Frieleia Dall, 1895	2	38–2393	*F. halli* Dall, 1895: Pacific Ocean: Japan, Honshu; Bering Sea; Kuril Is.; Kamchatka Penin.; Alaska; British Columbia; Washington; Oregon; California (Dall, 1895, 1920; Hatai, 1936a, 1940; Cooper, 1959; Bernard, 1972; Zezina, 1997b)
		311	*F. pellucida* (Yabe & Hatai, 1934): Pacific Ocean: Japan, eastern coast of Shikoku (Hatai, 1936a, 1940; Cooper, 1959)
Compsothyris Jackson, 1918	2	2507–2525	*C. ballenyi* Foster, 1974: Antarctica: Balleny Is. (Foster, 1974)
		329–2580	*C. racovitzae* (Joubin, 1901): Antarctica: circumpolar (Cooper, 1959; Foster, 1974)
Grammetaria Cooper, 1959	2	292–780	*G. bartschi* (Dall, 1920): Pacific Ocean: Philippines, Moluccas, Indian Ocean: south of Bali (Dall, 1920; Cooper, 1959; Zezina, 1981b)
		240–700	*G. africa* Hiller, 1986: Indian Ocean: S. Africa; W. Pacific Ocean: New Caledonia, Loyalty Is. (Hiller, 1986, 1991, 1994; Laurin, 1997)
Hispanirhynchia Thomson, 1927	1	105–2388	*H. cornea* (Fischer, 1887): Atlantic Ocean: British Isles; G. of Gascogne; N. Spain; Portugal; Morocco; Canary Is. (Davidson, 1887 in 1886–1888; Fischer & Oehlert, 1891; Cooper, 1959; d'Hondt, 1976; Brunton & Curry, 1979; Cooper, 1981b; Logan, 1988a; Anadón, 1994; Alvarez & Emig, 2005)
Abyssorhynchia Zezina, 1980	1	1409–4600	*A. craneana* (Dall, 1895): Pacific Ocean: G. of Panama; Marcus-Necker seamounts; Kipingamarangi Rise (Dall, 1920; Zezina, 1981b)
Manithyris Foster, 1974	1	2897–2904	*M. rossi* Foster, 1974: Antarctica: northern part of Ross Sea (Foster, 1974)
Parasphenarina Motchurova-Dekova, Saito, & Endo, 2002	2	0–40	*P. cavernicola* Motchurova-Dekova, Saito, & Endo, 2002: Pacific Ocean: Japan, Okinawa (Motchurova-Dekova, Saito, & Endo, 2002)
		240	*P. ezogremena* Zezina, 1981a: Indian Ocean: Flores Sea, north of Bali (Zezina, 1981a; Motchurova-Dekova, Saito, & Endo, 2002)
Neorhynchia Thomson, 1915	2	4124–4513	*N. strebeli* (Dall, 1908): Pacific Ocean: Galapagos Is., Peru; Chile; New Guinea; New Caledonia (Dall, 1920; Cooper, 1959, 1972, 1973b; Muir-Wood, 1960; McCammon & Buchsbaum, 1968; Foster, 1974; Laurin, 1997)
		3039–3916	*N. profunda* Cooper, 1972: Pacific Ocean: California; Baja California, Mexico (Cooper, 1972; Brand & others, 2003)
Tethyrhynchia Logan, 1994	1	3–60	*T. mediterranea* Logan, 1994: Mediterranean Sea: S. France; Tunisia; Croatia; Italy, Sicily, Ustica Is. (Logan & Zibrowius, 1994; La Perna, 1998; Simon & Willems, 1999; Di Geronimo & others, 2001; Logan & others, 2004)

TABLE 47. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Hemithiridoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Hemithiris d'Orbigny, 1847	4	0–2078	*H. psittacea* (Gmelin, 1790): Arctic Ocean: circumpolar: Chukchi Sea; E. Siberia Sea; Laptev Sea; Kara Sea; Barents Sea; Atlantic Ocean: Greenland; Faroes; Baffin Bay; E. Canada to G. of St. Lawrence and Newfoundland; Iceland; Norway; N. British Isles; Scandinavia; Pacific Ocean: N. Japan (Hokkaido); Kuril Is.; Kamchatka Penin.; Sea of Okhotsk; Bering Sea; Alaska; British Columbia to S. Oregon (Jeffreys, 1878; Davidson, 1887 in 1886–1888; Dall, 1920; Hatai, 1940; Wesenberg-Lund, 1938, 1939, 1940a, 1940b, 1941; Cooper, 1959, 1973d; Bousfield, 1960; Bernard, 1972; Brunton & Curry, 1979; Zezina, 1997b; Saito & Tazawa, 2002)
		20–166	*H. woodwardi* (Adams, 1863): Pacific Ocean: Japan, Hokkaido; (Cooper, 1959; Saito & Tazawa, 2002)
		?	*H. braunsi* Hayasaka, 1928: Pacific Ocean: Japan (Cooper, 1959)
		?	*H. peculiaris* Nomura & Hatai, 1936: Pacific Ocean: Japan (Cooper, 1959)
Pemphyxina Cooper, 1981a	1	90–315	*P. pyxidata* (Davidson, 1880): Indian Ocean: Kergeulen Is; Amsterdam, Heard Is. (Davidson, 1880; Stüder, 1889; d'Hondt, 1976; Cooper, 1981a)
Notosaria Cooper, 1959	2	0–800	*N. nigricans* (Sowerby, 1846): Pacific Ocean: New Zealand, Kermadec Is., Chatham Is. (Cooper, 1959; Bowen, 1968; Foster, 1974; Lee, 1978; Lee & Wilson, 1979; Richardson, 1981)
		805	*N. reinga* Lee & Wilson, 1979: Pacific Ocean: New Zealand, Three Kings Is., N. Island, Kermadec Is. (Lee & Wilson, 1979; Dawson, 1991)

HEMITHIRIDOIDEA

The superfamily Hemithiridoidea has 7 extant species belonging to 3 genera (Table 47, Fig. 1942). *Hemithiris* has 4 species but little is known about *H. braunsi* and *H. peculiaris,* emphasizing the need for a restudy of these (and other) Japanese species. *Hemithiris psittacea* is a common boreal species of wide longitudinal and great bathymetric range, always occurring above 30° N, and succeeded southward in the northeastern Atlantic by *Hispanirhynchia cornea*, or elsewhere in the Atlantic, by terebratuloids. *Pemphyxina* contains one species, found in shallow water only in the vicinity of the Kerguelen Islands, southern Indian Ocean. *Notosaria* is represented by 2 species from the neritic and upper bathyal zones around New Zealand and the Kermadec Islands to the east.

ORDER THECIDEIDA

THECIDEOIDEA

The order Thecideida contains only the superfamily Thecideoidea (BAKER, 2006) with 13 extant species belonging to 5 genera (Table 48, Fig. 1943). The lacazelline subfamily is represented by *Lacazella, Pajaudina,* and *Ospreyella*, the thecidellinine subfamily by *Thecidellina* and *Kakanuiella*. *Lacazella* occurs in the Mediterranean Sea, Caribbean Sea, and the Indian Ocean, although there is an undescribed form from Okinawa, Japan (M. SAITO, personal communication, 25 September 2003). *Pajaudina* is monotypic and known only

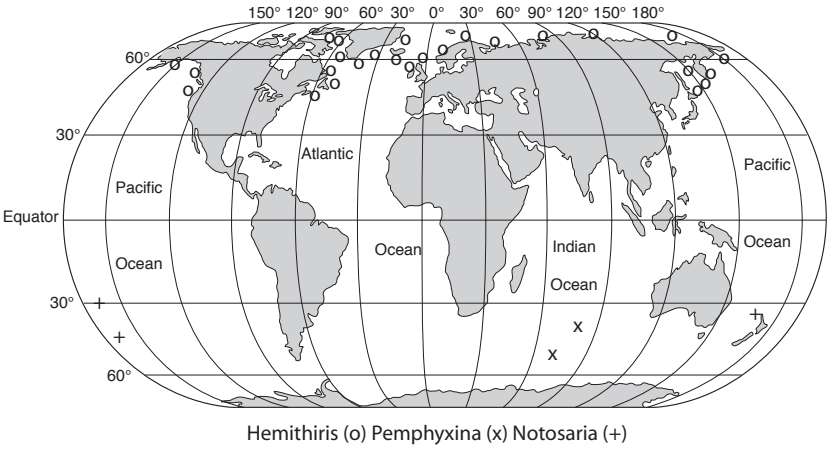

FIG. 1942. Geographic distribution of extant articulated brachiopod genera in superfamily Hemithiridoidea (new).

from the Canary Islands and *Ospreyella* from the Great Barrier Reef, the Maldive Islands, and the northwestern Pacific (LOGAN, 2005; personal observation, 2007). *Thecidellina* is recorded from Cape Verde, the Caribbean Sea, Red Sea, and Indo-Pacific region. LEE and ROBINSON (2003), LÜTER and others (2003), and LOGAN (2005) have reviewed the status, ecology, and biogeography of Recent lacazelline and thecidellinine species. All are small cementing forms, variable in shape, and typically occur in shallow but poorly accessible cryptic habitats, hence the occasional discovery of new taxa by divers. Living thecideoids are typically low latitude, neritic zone dwellers, but their latitudinal and bathymetric range has been extended by the recent discovery by LÜTER (2005) of a new extant species of the thecidellinine genus *Kakanuiella* from the bathyal zone south of New Zealand at a latitude of 44° S.

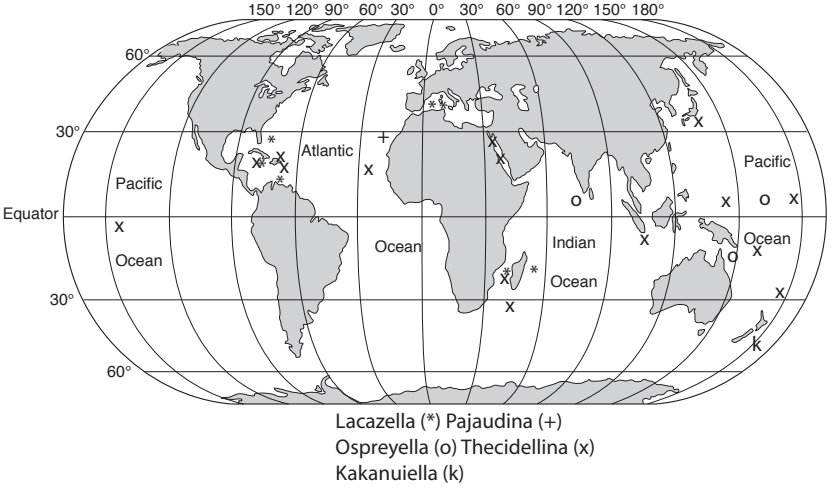

FIG. 1943. Geographic distribution of extant articulated brachiopod genera in superfamily Thecideoidea (new).

TABLE 48. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Thecideoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Lacazella Munier-Chalmas, 1881	3	25–60	*L. caribbeanensis* Cooper, 1977: Caribbean Sea: Bahamas, Jamaica, Curaçao (Meile & Pajaud, 1971; Pajaud, 1974; Cooper, 1977; Logan, 2004)
		?	*L. mauritiana* Dall, 1920: Indian Ocean: Mauritius, ?Europa Is. (Dall, 1920; Cooper, 1973b; Zezina, 1987)
		1–110	*L. mediterranea* (Risso, 1826): Mediterranean Sea: Tunisia, Algeria (Pajaud, 1970; Logan, 1979, 2004; Logan & others, 2004)
Pajaudina Logan, 1988	1	10–50 (1000?)	*P. atlantica* Logan, 1988: Atlantic Ocean: Canary Is. (Logan, 1988a, 1988b, 2004; Alvarez & Emig, 2005)
Ospreyella Lüter, Worheide, & Reitner, 2003	2	15–20	*O. depressa* Lüter, 2003: Pacific Ocean: NE Australia, Coral Sea (Lüter, Worheide, & Reitner, 2003)
		24–39	O. *maldiviana* Logan, 2005: Indian Ocean: Maldive Is. (Logan, 2005)
Thecidellina Thomson, 1915	6	3–130 (850?)	*T. barretti* (Davidson, 1864): Caribbean Sea: Jamaica, Cayman Is., Puerto Rico; Dominican Republic, Guadeloupe, Saba; Atlantic Ocean: Cape Verde (Davidson, 1887 in 1886–1888; Cooper, 1934; Pajaud, 1970; Jackson, Goreau, & Hartman, 1971; Cooper 1977; Logan, 1977, 1988a, 1990; Lee & Robinson, 2003)
		55–84 (1463?)	*T. blochmanni* Dall, 1920: Indian Ocean: Europa Is., Christmas Is., Réunion (Pajaud, 1970; d'Hondt, 1987; Lee & Robinson, 2003)
		0–436	*T. congregata* Cooper, 1954b: Pacific Ocean: Marshall Is., Guam, Saipan, Palau (Cooper, 1954b; Pajaud, 1970; Jackson, Goreau, & Hartman, 1971; Grant, 1987; Thayer & Allmon, 1991; Lee & Robinson, 2003)
		150–183	*T. japonica* (Hayasaka, 1938): Pacific Ocean: Japan (Hatai, 1940; Pajaud, 1970; Lee & Robinson, 2003)
		47–146	*T. maxilla* (Hedley, 1899): Pacific Ocean: Kermadec Is., Tuvalu, New Hebrides Is., Marshall Is., Taumotu Is; Indian Ocean: Réunion (Cooper, 1954b, 1964; d'Hondt, 1987; Lee & Robinson, 2003)
		380	*T. minuta* Cooper, 1981a: Indian Ocean: south of Madagascar (Cooper, 1981a; Lee & Robinson, 2003)
Kakanuiella Lee & Robinson, 2003	1	405–1024	*K. chathamensis* Lüter, 2005: Pacific Ocean: east of Chatham Island and on Chatham Rise, New Zealand (Lüter, 2005)

TABLE 49. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Terebratuloidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Acrobrochus Cooper, 1983	3	1058–2342	*A. blochmanni* (Jackson, 1912): Antarctica: Ross and Weddell Seas (Jackson, 1912; Foster, 1974; Cooper, 1983)
		415–612	*A. hendleri* (Cooper, 1982): Atlantic Ocean: off S. Sandwich Is. (Cooper, 1982, 1983)
		732–1919?	*A. vema* (Cooper, 1973d): Atlantic Ocean: S. America: Burdwood Bank, off southeastern tip of Argentina; S. Georgia Is. (Cooper, 1973d, 1982, 1983)
Liothyrella Thomson, 1916	9	7–2273	*L. antarctica* (Blochmann, 1906): Antarctica: circumpolar; S. Georgia Is.; Falkland Is.; S. Orkney Is. (Blochmann, 1906; Foster, 1974; Zezina, 1985)
		760–1208?	*L. delsolari* Cooper, 1982: Pacific Ocean: Peru; Cape Horn (Cooper, 1982; Foster, 1989)
		110–384	*L. moseleyi* (Davidson, 1878): Indian Ocean: Crozet and Kerguelen Is. (Davidson, 1886 in 1886–1888; Dall, 1920; Foster, 1974; Cooper, 1981a)
		1058–2342	*L. multiporosa* Foster, 1974: Antarctica: Ross Sea (Foster, 1974)
		6–805	*L. neozelanica* Thomson, 1918: Pacific Ocean: S. Island, New Zealand; Chatham Rise (Bowen, 1968; Dawson, 1971, 1991; Foster, 1974, 1989; Richardson, 1981; Campbell & Fleming, 1981; Cooper, 1983; Lüter, 2007)
		75–198	*L. oblonga* Cooper, 1973d: Atlantic Ocean: southern tip of S. America: Tierra del Fuego, Burdwood Bank, south of Falkland Is. (Cooper, 1973d)
		516–1244	*L. scotti* Foster, 1974: Antarctica: Scott Island (Foster, 1974)
		7–974	*L. uva* (Broderip, 1833): Pacific Ocean: Mexico, Panama, Ecuador, Chile; S. Atlantic O. and Antarctica: Strait of Magellan, S. Argentina, Falkland Is., S. Georgia Is., S. Orkney Is., S. Sandwich Is. (Davidson, 1886 in 1886–1888; Dall, 1920; Cooper, 1973d, 1982, 1983; Foster, 1974, 1989; Peck, Brockington, & Brey, 1997)
		672–680	*L. winteri* (Blochmann, 1906): Indian Ocean: St. Paul Is.; Kerguelen Is. (Blochmann, 1906; Helmcke, 1940; Foster, 1974; d'Hondt, 1977)
Gryphus Megerle von Mühlfeldt	5	125–915	*G. bartlettii* Dall, 1882: Caribbean Sea: G. of Mexico; Cuba; Lesser Antilles (Virgin Is., Martinique, Montserrat, Grenada, St. Kitts, Barbados) (Davidson, 1886 in 1886–1888; Dall, 1920; Cooper, 1934, 1954a, 1977; Logan, 1977; Asgaard & Stentoft, 1984)
		50–240	*G. capensis* Jackson, 1952: Indian Ocean: S. coast of S. Africa (Jackson, 1952; Hiller, 1991; 1994)
		2136–3700	*G. clarkeana* Dall, 1920: Pacific Ocean: SW of Galapagos Is.; G. of Panama (Dall, 1895, 1920)
		120–549	*G. tokionis* Dall, 1920: Pacific Ocean: Japan; Honshu (Dall, 1920; Hatai, 1936a, 1940)
		73–2663	*G. vitreus* (Born, 1778): Atlantic Ocean: Mediterranean Sea; G. of Gascogne; Portugal; N. Spain; NW Africa; Cape Verde? (Forbes, 1844; Davidson, 1886 in 1886–1888; Fischer & Oehlert, 1891; Dall, 1920; d'Hondt, 1976; Logan, 1979; Brunton & Curry, 1979; Cooper, 1981b, 1983; Emig, 1985, 1987; Brunton, 1988; Aliani, 1994; Logan & others, 2004; Alvarez & Emig, 2005)
Tichosina Cooper, 1977	20	165–229	*T. abrupta* Cooper, 1977: Caribbean Sea: SW coast of Florida (Cooper, 1977)
		512–686	*T. bahamiensis* Cooper, 1977: Caribbean Sea: Grand Bahama Is., Bahamas (Cooper, 1977)
		164–909	*T. bartschi* (Cooper, 1934): Caribbean Sea: north coast of Virgin I.; Puerto Rico; G. of Mexico (Cooper, 1934, 1977)
		201–289	*T. bullisi* Cooper, 1977: Caribbean Sea: Nicaragua (Cooper, 1977, 1983)
		146–963	*T. cubensis* (Pourtalès, 1867): Caribbean Sea: Florida; Bahamas; Greater and Lesser Antilles (Dall, 1871, 1920; Cooper, 1954a, 1977)
		123–458	*T. dubia* Cooper, 1977: Caribbean Sea: Lesser Antilles; Guyana (Cooper, 1977, 1983)
		120–732	*T. elongata* Cooper, 1977: Caribbean Sea: Cuba; Guyana (Cooper, 1977; Logan, 1990)
		494–695	*T. erecta* Cooper, 1977: Caribbean Sea: Florida; Bahamas; Cuba (Cooper, 1977)
		348–549	*T. expansa* Cooper, 1977: Caribbean Sea: southernmost Bahamas; Yucatan Channel, Mexico (Cooper, 1977)
		119–218	*T. floridensis* Cooper, 1977: Caribbean Sea: G. of Mexico; W. Florida; Dry Tortugas; Cuba (Cooper, 1977)

TABLE 49. *Continued.*

		231–258	*T. labiata* Cooper, 1977: Caribbean Sea: east side of St. Vincent (Cooper, 1977)
		309	*T. martinicensis* (Dall, 1920): Caribbean Sea: west side of Martinique (Cooper, 1977, 1983)
		60–641	*T. obesa* Cooper, 1977: Caribbean Sea: G. of Mexico, Strait of Yucatan; Venezuela; French Guiana (Cooper, 1977, 1983)
		366	*T. ovata* Cooper, 1977: Caribbean Sea: G. of Mexico, south of New Orleans, Louisiana (Cooper, 1977, 1983)
		130–165	*T. pillsburyae* Cooper, 1977: Caribbean Sea: Dominican Republic (Cooper, 1977)
		93–115	*T. plicata* Cooper, 1977: Caribbean Sea: Venezuela; Trinidad (Cooper, 1977, 1983)
		201–534	*T. rotundovata* Cooper, 1977: Caribbean Sea: east coast of Florida; Strait of Florida; Bahamas; Yucatan Channel, Mexico (Cooper, 1977)
		210–302	*T. solida* Cooper, 1977: Caribbean Sea: G. of Mexico, south of New Orleans, Louisiana; Strait of Florida (Cooper, 1977, 1983)
		403–708	*T. subtriangulata* Cooper, 1977: Caribbean Sea: Cuba; Puerto Rico (Cooper, 1977)
		284–650	*T. truncata* Cooper, 1977: Caribbean Sea: Bahamas; Strait of Yucatan, Mexico (Cooper, 1977)
Arctosia Cooper, 1983	1	136–1500	*A. arctica* Friele, 1877: Atlantic Ocean: E. Greenland; Iceland; Jan Mayen Is.; Barents Sea? (Davidson, 1886 in 1886–1888; Dall, 1920; Wesenberg-Lund, 1938, 1941; Cooper, 1983; Zezina, 1997b)
Dolichozygus Cooper, 1983	1	101–219	*D. stearnsi* Dall & Pilsbry, 1891: Pacific Ocean: Japan; Strait of Korea; Banda Sea (Kei Is.) (Hatai, 1936a, 1940; Cooper, 1983; Zezina, 1987)
Dysedrosia Cooper, 1983	1	240–930	*D. borneoensis* (Dall, 1920): Pacific Ocean: Indonesia; Borneo (Sibuko Bay); Kei Is. (Dall, 1920; Jackson & Stiasny, 1937; Zezina, 1981a; Cooper, 1983)
Erymnia Cooper, 1977	1	275–575	*E. muralifera* Cooper, 1977: Caribbean Sea: Bahamas; Virgin Is. (Cooper, 1977, 1983)
Zygonaria Cooper, 1983	2	101–780	*Z. davidsoni* (Adams, 1867): Pacific Ocean: S. Japan; Strait of Korea; Indian Ocean: south of Bali (Dall, 1920; Hatai, 1940; Zezina, 1981a; Cooper, 1983)
		190–578	*Z. joloensis* (Dall, 1920): Pacific Ocean: Philippines (Dall, 1920; Cooper, 1983)
Dallithyris Muir-Wood, 1959	3	165–275	*D. fulva* Blochmann, 1906: Pacific Ocean: S. Australia; Tasmania (Blochmann, 1906; Cooper, 1983)
		240–970	*D. murrayi* Muir-Wood, 1959: Indian Ocean: Maldive Is., Saya de Malha Bank; Pacific Ocean: Nazca Ridge (Muir-Wood, 1959; Cooper, 1983; Zezina, 1985, 1990)
		640–753	*D. pacifica* Bitner, 2006b: Pacific Ocean: Fiji (Bitner, 2006b)
Kanakythyris Laurin, 1997	1	245–470	*K. pachyrhynchos* Laurin, 1997: Pacific Ocean: New Caledonia; Loyalty Is. (Laurin, 1997)
Stenosarina Cooper, 1977	8	183–375	*S. angustata* Cooper, 1977: Caribbean Sea: Bahamas; Gulf of Mexico, Campeche Shelf north of Yucatan Peninsula (Cooper, 1977, 1983)
		275–1140	*S. crosnieri* (Cooper, 1983): Indian Ocean: NW side of Madagascar; W. Pacific Ocean: Norfolk Ridge; New Caledonia; Loyalty Is. (Cooper, 1983; Laurin, 1997; Zezina, 2005)
		255–2220	*S. davidsoni* Logan, 1998: Atlantic Ocean: N. Spain; Portugal; G. of Gascogne; Azores; Ascension Is.; Canary Is.; Cape Verde; seamounts off Iberian Peninsula and Morocco; ?Caribbean Sea: Florida; Cuba; Barbados (Davidson, 1886 in 1886–1888; Fischer & Oehlert, 1891; Dall, 1920; Muir-Wood, 1959; Cooper, 1981b, 1983; Logan, 1988a, 1998; Gaspard, 2003b; Alvarez & Emig, 2005)
		280–520	*S. globosa* Laurin, 1997: Pacific Ocean: New Caledonia; Loyalty Is. (Laurin, 1997)
		850–965	*S. lata* Laurin, 1997: Pacific Ocean: New Caledonia (Laurin, 1997)
		549–608	*S. nitens* Cooper, 1977: Atlantic Ocean: NW side of Dominica; eastern end of Dominican Republic (Cooper, 1977, 1983)
		384	*S. oregonae* Cooper, 1977: Atlantic Ocean: G. of Mexico, Campeche Bank; off W. Cuba (Cooper, 1977)
		439–549	*S. parva* Cooper, 1977: Atlantic Ocean: between Puerto Rico and Dominican Republic (Cooper, 1977, 1983)

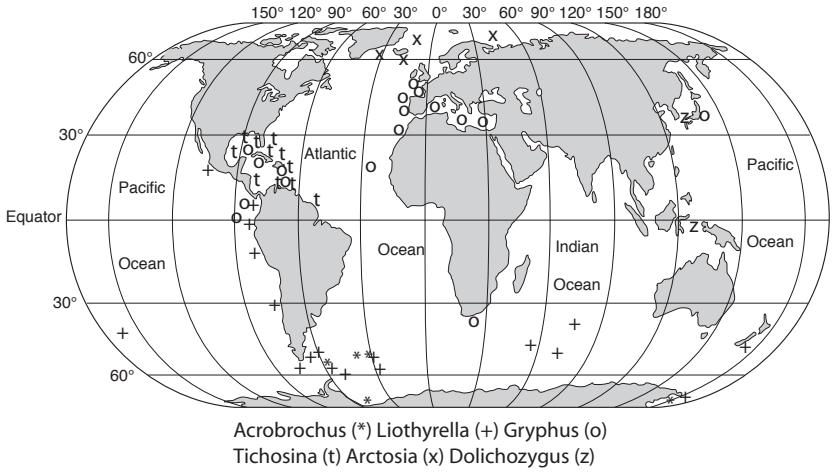

FIG. 1944. Geographic distribution of extant articulated brachiopod genera in superfamily Terebratuloidea (new).

ORDER TEREBRATULIDA

The order Terebratulida contains 12 superfamilies (listed below) with extant genera. Their geological ranges may be found in LEE and others (2006).

TEREBRATULOIDEA

The superfamily Terebratuloidea includes 55 extant species belonging to 12 genera (Table 49, Fig. 1944–1945). Five genera are monotypical: *Arctosia* is a neritic–upper bathyal form from boreal latitudes in the Atlantic, *Dolichozygus* (neritic) and *Dysedrosia* (neritic–upper bathyal) are found in the western Pacific from Japan and Indonesia, while *Erymnia* from the Caribbean and *Kanakythyris* from the southwestern Pacific occur in the upper bathyal zone. *Zygonaria* with 2 species has a similar geographic distribution and depth range as *Dysedrosia*. The 3 species of *Acrobrochus*

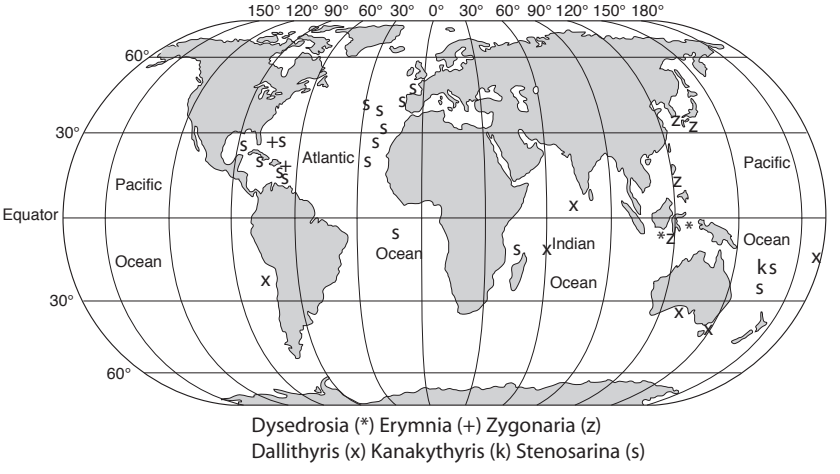

FIG. 1945. Geographic distribution of extant articulated brachiopod genera in superfamily Terebratuloidea (new).

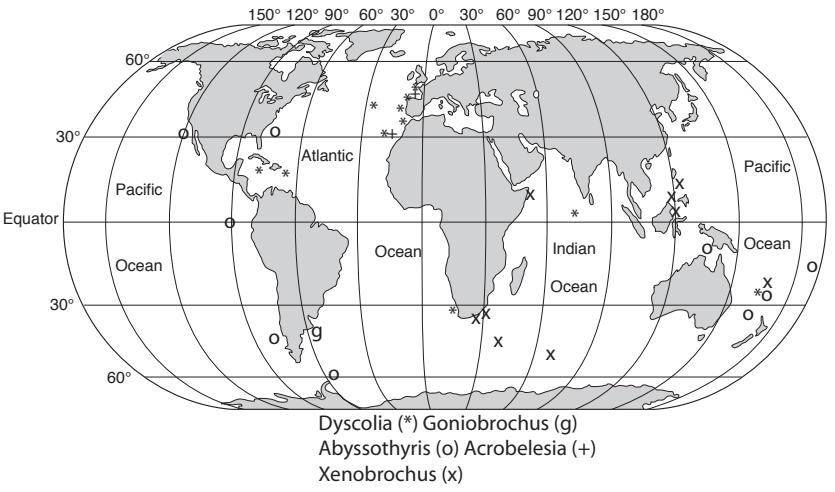

FIG. 1946. Geographic distribution of extant articulated brachiopod genera in superfamily Dyscolioidea (new).

all occur in the bathyal zone at high latitudes in the South Atlantic and Antarctica. *Dallithyris* has 3 species, one of which is from the central Indian Ocean, another from southern Australia, and a third from the eastern Pacific. The most common species of *Gryphus* is *G. vitreus* from the eastern Atlantic and the Mediterranean, where in the latter region it is particularly abundant on gravels at the heads of submarine canyons in the neritic–uppermost bathyal transitional zone (LOGAN, 1979; EMIG, 1985, 1987). Other species of *Gryphus* are known from the Caribbean, eastern Pacific, Japan, and off the southern tip of South Africa. *Tichosina* has 20 described species, all from the neritic and upper bathyal zones of the Caribbean region (COOPER, 1977) and needs to be restudied from larger populations than previously. Of the 9 species of *Liothyrella*, 8 are found in the neritic and bathyal zones of the southern hemisphere from the South Atlantic and Antarctica through the southern Indian Ocean to the southwestern Pacific Ocean, with only *L. uva* extending its range north into Central America. *Stenosarina* has 8 species, 4 of which are known only from the Caribbean area. *S. davidsoni* is typically found around the coasts, offshore islands, and seamounts of the eastern North Atlantic from the Gulf of Gascogne to Cape Verde, at depths ranging from 255–2220 m (LOGAN, 1998; GASPARD, 2003b).

DYSCOLIOIDEA

The superfamily Dyscolioidea includes 15 extant species belonging to 5 genera (Table 50, Fig. 1946). *Acrobelesia* and *Goniobrochus* are monotypical genera from the upper bathyal zone of the northeastern and southwestern Atlantic, respectively. *Dyscolia* and *Abyssothyris* each contain 3 species and are widely distributed geographically. *Dyscolia* is known from the bathyal zone of all three major oceans, with only the Atlantic-Caribbean species *D. wyvillei* extending up into the neritic zone. Similarly, all three species of *Abyssothyris* are predominantly deep-water forms, with *A. wyvillei* reaching one of the greatest depths (5631 m) of any modern brachiopod (FOSTER, 1989). *Abyssothyris* is widely distributed in all oceans except the Indian Ocean (COOPER, 1983). *Xenobrochus*, which is restricted to the Indian Ocean and western Pacific region, contains 7 species, most of which are neritic and upper bathyal zone dwellers.

CANCELLOTHYRIDOIDEA

The superfamily Cancellothyridoidea contains 51 extant species belonging to 10

TABLE 50. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Dyscolioidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Dyscolia Fischer & Oehlert, 1890	3	735–1463	*D. johannisdavisi* (Alcock, 1894): Indian Ocean: Maldive Is.; east coast of S. Africa. Pacific Ocean: New Caledonia, Chesterfield Is. (Alcock, 1894; Helmcke, 1940; Muir-Wood, 1959; Cooper, 1983; Hiller, 1986, 1991, 1994; Laurin, 1997)
		550–1098	*D. subquadrata* (Jeffreys, 1878): Atlantic Ocean: Portugal; G. of Gascogne; Canary Is. (Jeffreys, 1878; Davidson, 1886 in 1886–1888; Cooper, 1983; Logan, 1983)
		73–1557	*D. wyvillei* (Davidson, 1878): Atlantic Ocean: Azores; coast of NW Africa and offshore seamounts; N. Spain; Caribbean Sea: St. Thomas; Jamaica (Davidson, 1886; Fischer & Oehlert, 1891; d'Hondt, 1976; Cooper, 1977, 1983; Logan, 1998; Alvarez & Emig, 2005)
Goniobrochus Cooper, 1983	1	595–642	*G. ewingi* (Cooper, 1973d): Atlantic Ocean: SE of Mar del Plata, Argentina (Cooper,1973d, 1983)
Abyssothyris Thomson, 1927	3	420–2590	*A. atlantica* Cooper, 1977: Atlantic Ocean: Cape Fear, S. Carolina; seamounts off NW Africa (Cooper, 1977; 1983; Logan, 1998; Alvarez & Emig, 2005)
		3601–3687	*A. elongata* Cooper, 1972: Pacific Ocean: off Baja California, Mexico (vicinity of 31°N, 119°W); S. Atlantic Ocean: S. Shetland Is. (Cooper, 1972, 1982, 1983)
		400–5631	*A. wyvillei* (Davidson, 1878): Pacific Ocean: Galapagos Is.; S. Australia; south of New Guinea; NW of New Zealand; New Caledonia and Loyalty Is.; Fiji; Chile; Antarctica; S. Atlantic Ocean: S. Shetland Is. (Davidson, 1886 in 1886–1888; Muir-Wood, 1960; Cooper, 1975, 1982, 1983; Foster, 1989; Dawson, 1991; Laurin, 1997; Bitner, 2006b)
Acrobelesia Cooper, 1983	1	330–1000	*A. cooperi* (d'Hondt, 1976): Atlantic Ocean: Gulf of Gascogne; Canary Is. (d'Hondt, 1976; Cooper, 1981b, 1983; Logan, 1983)
Xenobrochus Cooper, 1981a	7	240–675	*X. africanus* (Cooper, 1973b): Indian Ocean: S. Africa; Pacific Ocean: New Caledonia, Loyalty Is. (Cooper, 1973b, 1981a, 1983; Hiller, 1986, 1991, 1994; Laurin, 1997)
		155–620	*X. agulhasensis* (Helmcke, 1939): Indian Ocean: S. Africa, west, south, and east of Cape of Good Hope (Helmcke, 1939; Foster, 1974; Hiller, 1986, 1991, 1994)
		204–460	*X. anomalus* Cooper, 1981a: Indian Ocean: SE of Marion Is. at 46°57'S, 37°59'E (Cooper, 1981a)
		790	*X. australis* Cooper, 1981a: Indian Ocean: W. of Heard Is. at 53°20'S, 72°29'E (Cooper, 1981a)
		65–300	*X. indianensis* (Cooper, 1973b): Indian Ocean: Somalia; S. Africa; Pacific Ocean: Matthew Is., Loyalty Is. (Cooper, 1973b; Hiller, 1991, 1994; Laurin, 1997)
		70–780	*X. naudei* Hiller, 1994: Indian Ocean: east coast of S. Africa (Hiller, 1986, 1991, 1994)
		89–1272	*X. translucidus* (Dall, 1920): Pacific Ocean: Philippines; Indonesia; Borneo; Celebes Is. (Dall, 1920; Jackson & Stiasny, 1937; Cooper, 1983)

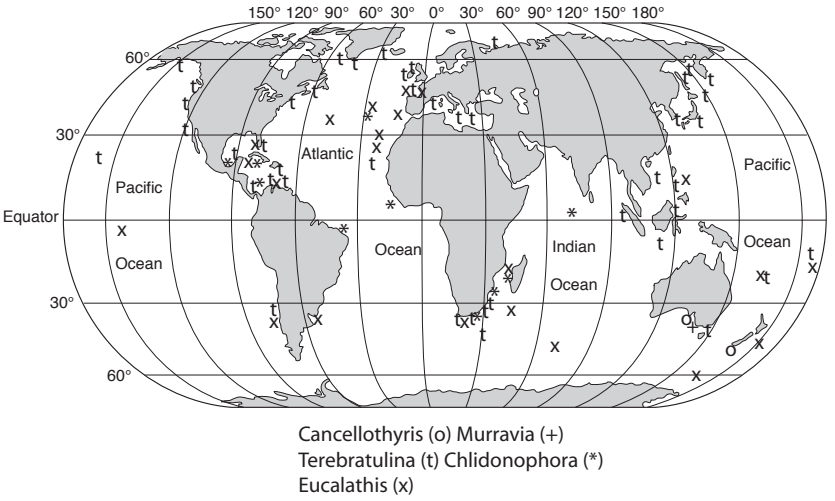

FIG. 1947. Geographic distribution of extant articulated brachiopod genera in superfamily Cancellothyridoidea (new).

genera (Table 51, Fig. 1947–1948). Three genera are monotypical: *Cancellothyris* is restricted to the neritic and upper bathyal zones around Australia and New Zealand, *Murravia* to South Australia, and *Agulhasia* to the southern tip of South Africa. The superfamily is dominated by two genera, *Terebratulina* and *Eucalathis*, which together account for 37 of the 50 extant species. *Terebratulina* is well represented in the North Atlantic and the adjacent seas of the Caribbean and Mediterranean but is absent from the South Atlantic. Ten species have been described from Japan and adjacent waters, which suggests that a reappraisal might be in order. While most species are neritic and upper bathyal zone dwellers, *T. septentrionalis* and *T. kiiensis* have great depth ranges. The 14 species of *Eucalathis* are also widely distributed, except for the northwestern Pacific area. Best known are the North Atlantic species *E. ergastica* and *E. tuberata,* both of which range greatly in depth. However, the 3 species of *Bathynanus* from the Indo-Pacific all appear to be predominantly deep water forms, with *B. inversus* reaching a depth of 5160 m. In contrast, both extant species of *Cnismatocentrum* from the northwestern Pacific have so far been obtained only from the neritic zone.

ZEILLERIOIDEA

The superfamily Zeillerioidea comprises 10 extant species belonging to a single genus, *Macandrevia* (Table 52, Fig. 1949). The genus occurs from pole to pole but is absent from the Indian Ocean and the western and central Pacific Ocean. The most common species is *M. cranium*, found throughout the North Atlantic from the equator to 77° N. Of the 10 species of *Macandrevia* that are known, 4 range down to the base of the bathyal zone, with *M. diamantina* extending into the abyssal zone, while only 3 are found in the neritic zone, indicating that this is a predominantly deep-water genus characteristic of the bathyal zone (COOPER, 1975; RICHARDSON, 1997b).

TABLE 51. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Cancellothyridoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Cancellothyris Thomson, 1926	1	6–366	*C. hedleyi* (Finlay, 1927): Pacific Ocean: Australia: S. Australia, Tasmania; New Zealand (Davidson, 1880, 1886 in 1886–1888; Blochmann, 1910; Dall, 1920; Foster, 1989; Dawson, 1991; Lüter & Cohen, 2002; Brand & others, 2003)
Murravia Thomson, 1916	1	73–273	*M. exarata* (Verco, 1910): Pacific Ocean: S. Australia (Blochmann, 1910; Thomson, 1927)
Terebratulina d'Orbigny, 1847	23	0–450	*T. abyssicola* Adams & Reeve, 1850: Indian Ocean: S and SE coasts of S. Africa, Moçambique (Dall, 1920; Jackson, 1952; Cooper, 1973b, 1973d; Hiller, 1991, 1994)
		400–410	*T. australis* Bitner, 2006b: Pacific Ocean: Fiji (Bitner, 2006b)
		18–700	*T. austroamericana* Zezina, 1980: Pacific Ocean: S. America: Chile (Zezina, 1985)
		32–1163	*T. cailleti* Crosse, 1865: Caribbean Sea: G. of Mexico; Florida to Barbados; northern coast of S. America (Dall, 1920; Cooper, 1954a, 1973d, 1977; Logan, 1977, 1990; Asgaard & Stentoft, 1984; Zezina, 2000)
		160–631	*T. callinome* Dall, 1920: Pacific Ocean: Japan; Philippines; Indonesia; Borneo (Dall, 1920; Hatai, 1936a; Jackson & Stiasny, 1937; Cooper, 1973c; Zezina, 1981a)
		236–545	*T. cavata* Verco, 1910: Pacific Ocean: S. Australia (Blochmann, 1910; Dall, 1920)
		485	*T. compressa* Cooper, 1973c: Pacific Ocean: Japan (Cooper, 1973c)
		113–858	*T. crossei* Davidson, 1882: Pacific Ocean: Japan; Sea of Okhotsk; Sakhalin Is.; Kuril Is.; Kamchatka Penin.; British Columbia; California (Davidson, 1886 in 1886–1888; Dall, 1920; Hatai, 1940; Bernard, 1972; Zezina 1997b)
		146	*T. hataiana* Cooper, 1973c: Pacific Ocean: Philippines (Cooper, 1973c)
		?	*T. hawaiiensis* Dall, 1920: Pacific Ocean: Hawaiian Is. (Dall, 1920; Cooper, 1973c)
		15–767	*T. japonica* (Sowerby, 1846): Pacific Ocean: Japan; Korea Strait; Fiji (Davidson, 1886 in 1886–1888; Dall, 1920; Cooper, 1957; Endo & Curry, 1991; Bitner, 2006b)
		18–4640	*T. kiiensis* Dall & Pilsbry, 1891: Pacific Ocean: Japan; Kuril Is. and Trench; Alaska; Washington; California; Chile (Dall, 1895; Zezina, 1970, 1997b; Cooper, 1982; Foster, 1989)
		?	*T. kitakamiensis* Hayasaka, 1938: Pacific Ocean: Japan: Honshu (Hatai, 1940)
		514	*T. kyusyuensis* Yabe & Hatai, 1934: Pacific Ocean: Japan: Kyushu (Hatai, 1936a)
		50–340	*T. meridionalis* Jackson, 1952: Atlantic–Indian Ocean: Cape of Good Hope; Moçambique Channel; Marion Is. (Davidson, 1880; Jackson, 1952; Cooper, 1973b; Hiller, 1991, 1994)
		102–550	*T. pacifica* Yabe & Hatai, 1934: Pacific Ocean: Japan; Loyalty Is. (Hatai, 1940; Zezina, 1981a; Laurin, 1997)
		119–981	*T. photina* Dall, 1920: Pacific Ocean: Japan; Philippines; Celebes Is.; Borneo; S. China Sea (Dall, 1920; Hatai, 1936a, 1940; Jackson & Stiasny, 1937; Cooper, 1973c; Zezina, 2001b)
		182	*T. radula* Hedley, 1904: Pacific Ocean: E. Australia (Dall, 1920)
		18–963	*T. reevei* Dall, 1920: Pacific Ocean: Philippines; Celebes Is.; Borneo; Loyalty Is.: Fiji; Norfolk Ridge (Dall, 1920; Cooper, 1973c; Laurin, 1997; Zezina, 2005; Bitner, 2006b)
		18–2157	*T. retusa* (Linnaeus, 1758): Atlantic Ocean: Barents Sea; Greenland; Iceland; Faroes; Norway; Sweden; Cape Verde; Mediterranean Sea (Fischer & Oehlert, 1891; Dall, 1920; Wesenberg-Lund, 1938, 1939, 1940a, 1941; Logan, 1979, 1983, 1988a; Brunton & Curry, 1979; Cooper, 1981b; Curry, 1982; Cohen & others, 1991, 1993; Zezina, 1997b, 2001b; Lüter & Cohen, 2002; Alvarez & Emig, 2005)
		0–3592	*T. septentrionalis* (Couthouy, 1838): Atlantic Ocean: western Greenland; Iceland; Faroes; Davis Strait; Labrador; Newfoundland; Nova Scotia to New York (Davidson, 1886 in 1886–1888; Dall, 1920; Wesenberg-Lund, 1938, 1940a, 1941; Logan & Noble, 1971; Witman & Cooper, 1983; Cohen & others, 1991; Lüter & Cohen, 2002)
		11–1247	*T. unguicula* (Carpenter, 1864): Pacific Ocean: Sea of Okhotsk; Kuril Is.; Kamchatka Penin.; Alaska; British Columbia; Washington; California (Dall, 1920; Cooper, 1973c; Thayer, 1975; Tunnicliffe & Wilson, 1988; Zezina, 1997b)
		73–1750	*T. valdiviae* Blochmann, 1908: Pacific Ocean: Japan; Philippines; Celebes Sea; Indian Ocean: SW of Sumatra (Blochmann, 1908; Dall, 1920; Jackson & Stiasny, 1937; Helmcke, 1940)
Chlidonophora Dall, 1903	2	630–2745	*C. chuni* Blochmann, 1906: Indian Ocean: Maldive Is.; Moçambique; Madagascar; South Africa (Blochmann, 1906; Helmcke, 1940; Muir-Wood, 1959; Cooper, 1973b; Hiller, 1986, 1991, 1994; Zezina, 1987)
		534–5310	*C. incerta* (Davidson, 1878): Caribbean Sea: G. of Mexico; Cuba, Jamaica, Haiti, Curaçao, Bonaire, Colombia; Atlantic Ocean: Azores; NE Brazil; off Sierra Leone (Dall, 1920; Cooper, 1954a, 1973d, 1977; Zezina, 1975a, 2000)
Eucalathis Fischer & Oehlert, 1890	14	380–635	*E. costellata* Cooper, 1981a: Indian Ocean: Moçambique Channel; banks south of Madagascar (Cooper, 1981a; Zezina, 1987)
		320–2005	*E. cubensis* Cooper, 1977: Caribbean Sea: Cuba, Bonaire, Curaçao, Saba Bank (Cooper, 1977; Logan, 1990; Zezina, 2000)
		280–2736	*E. ergastica* Fischer & Oehlert, 1890: Atlantic Ocean: N. Spain; Azores; Canary Is.; NW Africa and offshore seamounts; G. of Gascogne (Fischer & Oehlert, 1891; Cooper, 1981b; Logan, 1983, 1998; Anadón, 1994; Zezina, 2000; Gaspard, 2003b; Alvarez & Emig, 2005)

TABLE 51. *Continued.*

		915–1280	*E. fasciculata* Cooper, 1973b: Indian Ocean: Moçambique Channel; banks south of Madagascar; S. Africa (Cooper, 1973b; Hiller, 1986, 1991, 1994; d'Hondt, 1987)
		366	*E. floridensis* Cooper, 1977: Caribbean Sea: Florida (Cooper, 1977)
		595–642	*E. inflata* Cooper, 1973d: Atlantic Ocean: Argentina (Cooper, 1973d)
		2710–3870	*E. macroctena* Zezina, 1981: Pacific Ocean: Chile (Zezina, 1985)
		326–1153	*E. macrorhynchus* Foster, 1974: Pacific Ocean: Pacific-Antarctic Ridge (Foster, 1974, 1989)
		790	*E. magna* Cooper, 1981a: Indian Ocean: Heard Is; Kerguelen Is. (Cooper, 1981a)
		1098–2342	*E. murrayi* (Davidson, 1878): Indian Ocean: Kerguelen Is., Moçambique Channel; Pacific Ocean: Marquesas Is., Fiji, New Zealand (Kermadec Is.) (Davidson, 1880; Dawson, 1971, 1991; Foster, 1974; Zezina, 1987; Bitner, 2006a)
		185–360	*E. rotundata* Cooper, 1981a: Indian Ocean: S. of Madagascar (Cooper, 1981a; d'Hondt, 1987)
		192–1140	*E. rugosa* Cooper, 1973c: Indian Ocean: Moçambique Channel, Pacific Ocean: Philippines; Loyalty Is. (Cooper, 1973c; Zezina, 1981b, 1987; Laurin, 1997)
		909–1834	*E. trigona* (Jeffreys, 1878): Atlantic Ocean: Portugal; G. of Gascogne (Jeffreys, 1878; Dall, 1920; Saiz Salinas, 1989)
		549–2995	*E. tuberata* (Jeffreys, 1878): Atlantic Ocean: W of Gibraltar; G. of Gascogne; Canary Is.; N of Azores; seamounts off NW Africa (Jeffreys, 1878; Fischer & Oehlert, 1891; Dall, 1920; Brunton & Curry, 1979; Cooper, 1981b; Logan, 1983, 1988a; Zezina, 2000; Gaspard, 2003b; Logan & others, 2004; Alvarez & Emig, 2005)
Bathynanus Foster, 1974	3	4600–5160	*B. inversus* Zezina, 1981c: Indian Ocean: E and W of Ninety East Ridge (Zezina, 1981c, 1985)
		2520–3490	*B. rhizopodus* Zezina, 1981c: Indian Ocean: west of Maldive Is., (Zezina, 1981c, 1985)
		3843	*B. tenuicostatus* Foster, 1974: Pacific Ocean: (40°S, 119°36'W) (Foster, 1974; Zezina, 1985)
Nanacalathis Zezina, 1981c	2	3340–3731	*N. atlantica* Zezina, 1991: Atlantic Ocean: 25-29°N, 28-77°W (Cooper, 1973d; Zezina, 1991, 2000)
		289	*N. minuta* Zezina, 1981: Indian Ocean: Nazareth Bank; Mascarene Plat. (16°S, 61°E) (Zezina, 1981c, 1985)
Notozyga Cooper, 1977	2	740–800	*N. gracilis* Hiller, 1986: Indian Ocean: S. Africa (Hiller, 1986, 1990, 1994)
		320–732	*N. lowenstami* Cooper, 1977: Atlantic, off Bermuda; Caribbean Sea: Bonaire, Curaçao (Cooper, 1977; Logan, 1990)
Agulhasia King, 1871	1	50–800	*A. davidsoni* King, 1871: Indian Ocean: S. Africa: Cape Town, Agulhas Bank, Durban (Helmcke, 1940; Jackson, 1952; Cooper, 1973b, 1973d; Hiller, 1986, 1991, 1994)
Cnismatocentrum Dall, 1920	2	110–375	*C. sakhalinensis* (Dall, 1908): Pacific Ocean: Sea of Okhotsk; Sakhalin Is.; Alaska (Dall, 1920; Hatai, 1940; Zezina, 1997b)
		34–121	*C. parvum* Zezina, 1970: Pacific Ocean: Sea of Okhotsk; Kamchatka Penin.; Kuril Is.; Commander Is. (Zezina, 1997b)

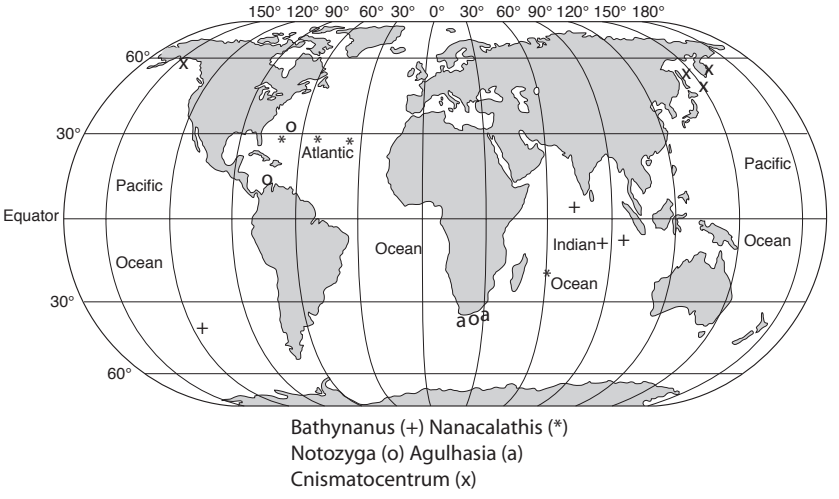

FIG. 1948. Geographic distribution of extant articulated brachiopod genera in superfamily Cancellothyridoidea (new).

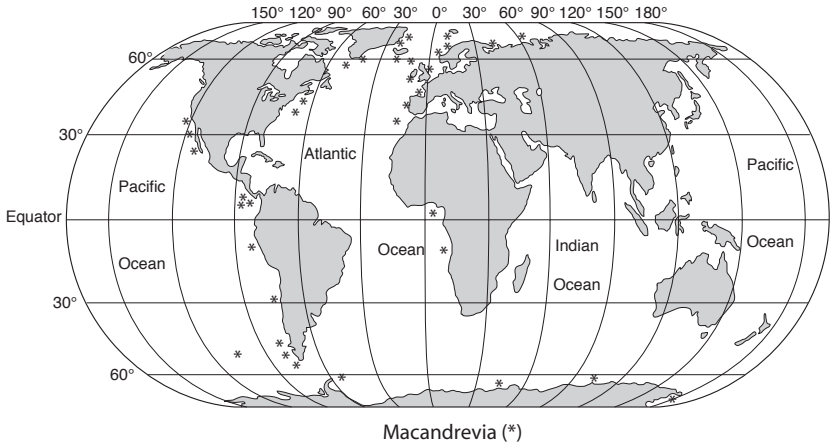

FIG. 1949. Geographic distribution of extant articulated brachiopod genera in superfamily Zeillerioidea (new).

TABLE 52. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Zeillerioidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Macandrevia King, 1859	10	3601–3972	*M. abyssa* Cooper, 1972: Pacific Ocean: California; Baja California; S. Pacific at 56°17'S, 156°13'W (Cooper, 1972, 1975)
		2332–3797	*M. africana* Cooper, 1975: Atlantic Ocean: G. of Guinea; Angola (Cooper, 1975; Laurin & Gaspard, 1987; Gaspard, 2003a)
		112–4066	*M. americana* Dall, 1895: Pacific Ocean: California; Panama; Chile; Atlantic Ocean: G. of Guinea; Angola; S. Sandwich Is.; S. Shetland Is.; Antarctica (Dall, 1920; Cooper, 1973d, 1982; Foster, 1974, 1989; d'Hondt, 1976)
		2268–3340	*M. bayeri* Cooper, 1975: Atlantic Ocean: SE of Benin at 4°58'N, 3°48-52'E; G. of Guinea; and near Azores (Cooper, 1975; Zezina, 1985, 2000; Laurin & Gaspard, 1987)
		2150	*M. craniella* Dall, 1895: Pacific Ocean: G. of Panama (Dall, 1920; Cooper, 1975)
		50–2951	*M. cranium* (Müller, 1776): Atlantic-Arctic Ocean: Norway; Svalbard; Novaya Zemlya; Barents Sea; Greenland; Iceland; Faroes; Canary Is.; G. of Gascogne; Morocco; N. Spain; Portugal; E. Atlantic seamounts; British Isles (Davidson, 1886 in 1886–1888; Fischer & Oehlert, 1891; Dall, 1920; Massy, 1925; Wesenberg-Lund, 1938, 1939, 1940a, 1940b, 1941; Atkins, 1959c; d'Hondt, 1973, 1976; Cooper, 1973d, 1975, 1981b; Brunton & Curry, 1979; Logan, 1983; Anadón, 1994; Zezina, 1997c, 2000; Gaspard, 2003a, 2003b; Logan & others, 2004)
		2140–4600	*M. diamantina* Dall, 1895: Pacific Ocean: G. of Panama; Peru; Antarctica (Dall, 1920; Cooper, 1972, 1975; Foster, 1974, 1989)
		1837–2338	*M. novangliae* Cooper, 1977 (not Dall, 1920): Atlantic Ocean: eastern USA; G. of Gascogne; N. Spain (Dall, 1920; Cooper, 1975, 1977, 1981b; Saiz Salinas, 1989)
		207–2654	*M. tenera* (Jeffreys, 1876): Atlantic Ocean: entrance to Davis Strait and east of Cape Farewell, Greenland, Labrador (Jeffreys, 1878; Davidson, 1886 in 1886–1888; Cooper, 1973d, 1975)
		119–930	*M. vanhoeffeni* Blochmann, 1906: Antarctica: circumpolar (Blochmann, 1906; Foster, 1974; Cooper, 1975)

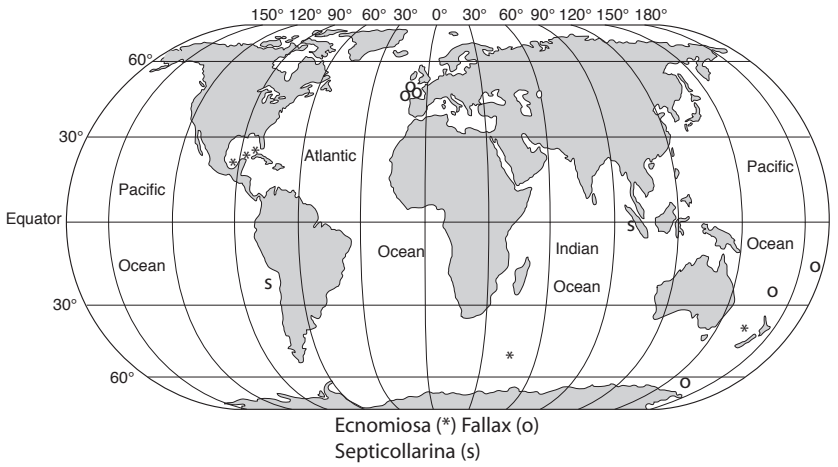

FIG. 1950. Geographic distribution of extant articulated brachiopod genera in superfamily Kingenoidea (new).

TABLE 53. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Kingenoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Ecnomiosa Cooper, 1977	2	723–915	*E. gerda* Cooper, 1977: Caribbean Sea: G. of Mexico; west of Cuba; Campeche shelf, S. Mexico; SW of Dry Tortugas, Florida (Cooper, 1977)
		884–1500	*E. inexpectata* Cooper, 1981a: Indian Ocean: Crozet Is. at 46°18'S, 51°14'E; Pacific Ocean: seamount west of Cook Strait, New Zealand (Cooper, 1981a; Lüter, 2007)
Fallax Atkins, 1960a	3	2285–2342	*F. antarcticus* Foster, 1974: Antarctica: at 62°47-50'S, 158°12-21'E (Foster, 1974; Zezina, 1985)
		219–1421	*F. dalliniformis* Atkins, 1960a: Atlantic Ocean: western English Channel; G. of Gascogne; N. Spain (Atkins, 1960a; Brunton & Curry, 1979; Cooper 1981b; Anadon, 1994)
		33–1620	*F. neocaledonensis* Laurin, 1997: Pacific Ocean: Loyalty Is. (Laurin, 1997; Bitner, 2006b). Zezina (2005) designated this as *Laurinia neocaledonesis*
Septicollarina Zezina, 1981	2	240	*S. hemiechinata* Zezina, 1981a: Indian Ocean: near Java at 07°29'S, 114°49' E (Zezina, 1981a, 1997a)
		270–485	*S. oceanica* Zezina, 1990: Pacific Ocean: Nazca Ridge (Zezina, 1990, 1997a)

TABLE 54. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Laqueoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Laqueus Dall, 1870	13	104–1839	*L. blanfordi* (Dunker, 1882): Pacific Ocean: Japan; Kamchatka Penin.; Bering Sea (Dall, 1920; Hatai, 1936a; Zezina, 1997b)
		338	*L. concentricus* Yabe & Hatai, 1936: Pacific Ocean: Japan, at 36°16'N, 139°29'E (Hatai, 1940)
		58–1565	*L. erythraeus* Dall, 1920: Pacific Ocean: Catalina Is., California; Alaska; Bering Sea; Sea of Okhotsk; Sikhote Alin (Dall, 1920; Hertlein & Grant, 1944; Zezina, 1997b; MacKinnon & Long, 2000)
		104–454	*L. japonicus* Yabe & Hatai, 1934: Pacific Ocean: Japan (Hatai, 1936a, 1940)
		222	*L. morsei* Dall, 1908: Pacific Ocean: Sea of Japan (Dall, 1920)
		115–604	*L. orbicularis* Yabe & Hatai, 1934: Pacific Ocean: Sea of Japan (Hatai, 1936a)
		23–205	*L. pacificus* Hatai, 1936a: Pacific Ocean: Japan (Hatai, 1936a, 1940)
		41–100	*L. pictus* (Chemnitz, 1839): Pacific Ocean: Japan; Strait of Korea (Davidson, 1887)
		150–194	*L. proprius* Yabe & Hatai, 1934: Pacific Ocean: Japan (Hatai, 1936a, 1940; Zezina, 1985)
		86–307	*L. quadratus* Yabe & Hatai, 1934: Pacific Ocean: Japan; Taiwan (Hatai, 1936a, 1940)
		80–907	*L. rubellus* (Sowerby, 1846): Pacific Ocean: Japan; Hawaiian Is. (Davidson, 1887; Dall, 1920; Hatai, 1936a, 1940; Zezina, 1981a; Saito, 1996)
		115–243	*L. suffusus* (Dall, 1870): Pacific Ocean: Japan; Strait of Korea (Dall, 1920; Hatai, 1940)
		2–494	*L. vancouverensis* Davidson, 1887: Pacific Ocean: western coast of Canada; USA (not California) (Davidson, 1887; Bernard, 1972; Thayer, 1975; Tunnicliffe & Wilson, 1988; MacKinnon & Long, 2000)
Glaciarcula Elliott, 1956	1	50–2700	*G. spitzbergensis* (Davidson, 1852d): Arctic Ocean–Atlantic Ocean: circumpolar: Greenland; Iceland; Norway; Faroes; Svalbard; Russian shorelines of Kara, Laptev, and Chukchi seas; Bering Sea (Kamchatka Penin.); Sea of Okhotsk (Kuril Is.), E. Canada; Portugal (above 40°N) (Davidson, 1887; Dall, 1920, Wesenberg-Lund, 1938, 1939, 1940a, 1940b, 1941; Brunton & Curry, 1979; Zezina, 1985, 1997b, 2001)
Frenulina Dall, 1895	3	59–110	*F. cruenta* Cooper, 1973b: Indian Ocean: Somalia; Moçambique Channel; S. Africa (Cooper, 1973b; Zezina, 1985; Hiller, 1994)
		260–458	*F. mauiensis* Dall, 1920: Pacific Ocean: Hawaiian Is. (Dall, 1920)
		5–541	*F. sanguinolenta* Gmelin, 1790: Pacific Ocean: Indonesia; Japan; Philippines; Marshall Is.; Loyalty Is.; Hawaiian Is.; Marquesas Is., Fiji; Tahiti; Tonga; E. Australia (Dall, 1920; Hatai, 1936a, 1940; Jackson & Stiasny, 1937; Cooper, 1957; Richardson, 1973; d'Hondt, 1987; Grant, 1987; Saito, 1996; Laurin, 1997; Bitner, 2006a, 2006b)
Jolonica Dall, 1920	4	187	*J. alcocki* (Joubin, 1906): Indian Ocean: southwest of southern point of India (8°23'N, 76°28'E) (Dall, 1920; Cooper, 1973b)
		0–200	*J. suffusa* (Cooper, 1973b): Indian Ocean: SE Africa, Moçambique; S. Africa (Cooper, 1973b; Hiller, 1991, 1994)
		262–579	*J. hedleyi* Dall, 1920: Pacific Ocean: Japan; China; Philippines; Celebes Is. Indian Ocean: Malay Archipelago; Bali (Dall, 1920; Jackson & Staisny, 1937; Cooper, 1957; Zezina, 1981a)
		91–106	*J. nipponica* Yabe & Hatai, 1934: Pacific Ocean: Shikoku Is., Izu Is., Japan (Hatai, 1936a, 1940; Saito, 1996)
Pictothyris Thomson, 1927	3	75	*P. elegans* Yabe & Hatai, 1936: Pacific Ocean: Oki Is., Sea of Japan (Hatai, 1940)
		119	*P. laqueformis* Yabe & Hatai, 1936: Pacific Ocean: W. Kyushu, E. China Sea (Hatai, 1940)
		28–205	*P. picta* (Dillwyn, 1817): Pacific Ocean: Sea of Japan; Honshu; Philippine Sea (Hatai, 1936a, 1940; Saito, 1996)
Shimodaia MacKinnon, Saito, & Endo, 1997	2	37–98	*S. pterygiota* MacKinnon, Saito, & Endo, 1997: Pacific Ocean: Japan, Honshu; S. China Sea (MacKinnon, Saito, & Endo, 1997)
		?	*S.* sp. nov. MacKinnon & Long (2007): Pacific Ocean: S. China Sea (MacKinnon & Long, 2007)

TABLE 54. *Continued.*

Terebratalia Beecher, 1893	5	13–287	*T. coreanica* (Adams & Reeve, 1850): Pacific Ocean: Japan, S. Hokkaido; China; Korea; Russia, Sikhote Alin (Davidson, 1887; Dall, 1920; Hatai, 1936a, 1940; Saito, 1996; Zezina, 1997b)
		307–1112	*T. gouldii* (Dall, 1891): Pacific Ocean: Japan (Dall, 1920; Hatai, 1940)
		31–467	*T. tisimana* (Nomura & Hatai, 1936): Pacific Ocean: Russia, Kuril Is.; Sea of Okhotsk; Kamchatka Pen.; Aleutian Is. (Hatai, 1940; Zezina, 1985, 1997b)
		0–1700	*T. transversa* (Sowerby, 1846): Pacific Ocean: Alaska; Aleutian Is.; British Columbia; Washington; California; Mexico (Davidson, 1887; Dall, 1920; Bernard, 1972)
		117–156	*T. xanthica* Dall, 1920: Pacific Ocean: Russia, Sakhalin Is.; Japan (Dall, 1920; Hatai, 1936a, 1940)
Coptothyris Jackson, 1918	1	115–353	*C. grayi* (Davidson, 1852d): Pacific Ocean: Japan; Strait of Korea (Davidson, 1886 in 1886–1888; Hatai, 1940; Saito, 1996)
Dallinella Thomson, 1915	1	91–205	*D. obsoleta* (Beecher, 1893): Pacific Ocean: California (Dall, 1920)
Diestothyris Thomson, 1916	1	0–435	*D. frontalis* (Middendorf, 1849): Pacific Ocean: Russia; Aleutian Is.; Sea of Okhotsk; Sikhote Alin; Kuril Is.; Kamchatka Penin.; Japan, Hokkaido; Alaska; British Columbia (Davidson, 1887; Dall, 1920; Hatai, 1936a, 1940; Bernard, 1972; Zezina, 1997b)
Simplicithyris Zezina, 1976b	2	5–580	*S. kurilensis* Zezina, 1976b: Pacific Ocean: Kamchatka, Kuril Is. (Zezina, 1976b, 1985, 1997b)
		118	*S. japonica* Dall, 1920: Pacific Ocean: Japan (off Hondo, Yokohama) (Dall, 1920; Hatai, 1936a, 1940; Zezina, 1985)
Tythothyris Zezina, 1979	1	5–400	*T. rosimarginata* Zezina, 1979: Pacific Ocean: Sea of Okhotsk; Kuril Is.; Commander Is.; Kamchatka Penin.; Sakhalin Is. (Zezina, 1997b)

KINGENOIDEA

The superfamily Kingenoidea includes 7 extant species belonging to 3 genera, *Ecnomiosa*, *Fallax,* and *Septicollarina* (Table 53, Fig. 1950). There are 2 species of *Ecnomiosa* known: *E. gerda* from the Caribbean Sea and *E. inexpectata* from the southern Indian Ocean, although this latter species has recently been identified from a seamount just west of Cook Strait, New Zealand at a depth of 957–1055 m by LÜTER (2007). While both species of *Ecnomiosa* are absent from the neritic zone, 2 of the 3 species of *Fallax* have been recorded from shallow water, although they range down into the bathyal zone. *Fallax neocaledonensis* and *F. antarcticus* occur in the western Pacific, north and south of New Zealand, respectively; the third species, *F. dalliniformis,* is typically a neritic and upper bathyal zone species known only from the eastern Atlantic, where, as the name implies, it is easily misidentified as *Dallina septigera* (ATKINS, 1960b). *Septicollarina* has 2 species from shallow water, one from the Indian Ocean around Java and the other from the Nazca Ridge area of the eastern Pacific**.**

LAQUEOIDEA

The superfamily Laqueoidea includes 37 extant species belonging to 12 genera (Table 54, Fig. 1951–1953). This is predominantly a shallow-water group, with over 70% of the species restricted to the neritic zone and 97% to the neritic to upper bathyal zone. Nine genera are restricted to the northern hemisphere, with only *Frenulina* and *Jolonica* represented south of the equator. *Glaciarcula*, with the Arctic species *G. spitzbergensis* as sole representative, is circumpolar in distribution and ranges greatly in depth. *Shimodaia* is a northeastern Pacific genus with 2 species so far obtained only from the neritic zone; *Coptothyris* and *Tythothyris* have similar geographic distributions to *Shimodaia* but extend into the uppermost bathyal zone, while *Diestothyris* is known from the northern Pacific region as far east as British

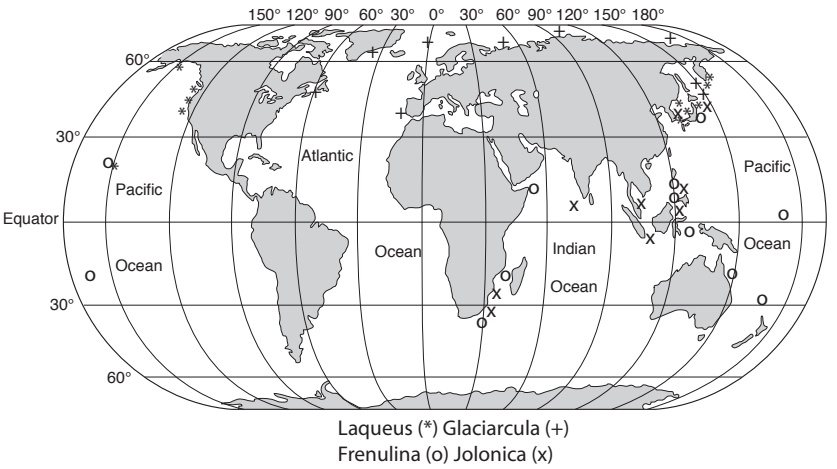

FIG. 1951. Geographic distribution of extant articulated brachiopod genera in superfamily Laqueoidea (new).

Columbia, where it is succeeded in California by the neritic zone genus *Dallinella*. The genus *Simplicithyris*, which has 2 extant species from the northwestern Pacific, is retained in the Laqueoidea following RICHARDSON (1997b). Of the remaining genera, *Laqueus* has 13 species, of which 11 are recorded from the neritic and upper bathyal zones around Japan. The Indo-Pacific genus *Frenulina* has 3 species, all living more or less in the neritic zone, with the Pacific species *F. sanguinolenta* being the most distinctive, although none are exclusive to shallow reefal substrates, as suggested by RICHARDSON (1997b). Three of the 4 species of the Indo-Pacific genus *Jolonica* are known only from the neritic zone, while the 3 shallow-water species of *Pictothyris* have all been described from the area around Japan. Of the 5 species of *Terebratalia* known, all are from the northern Pacific, *T. transversa* from the western coast of North America being the best known.

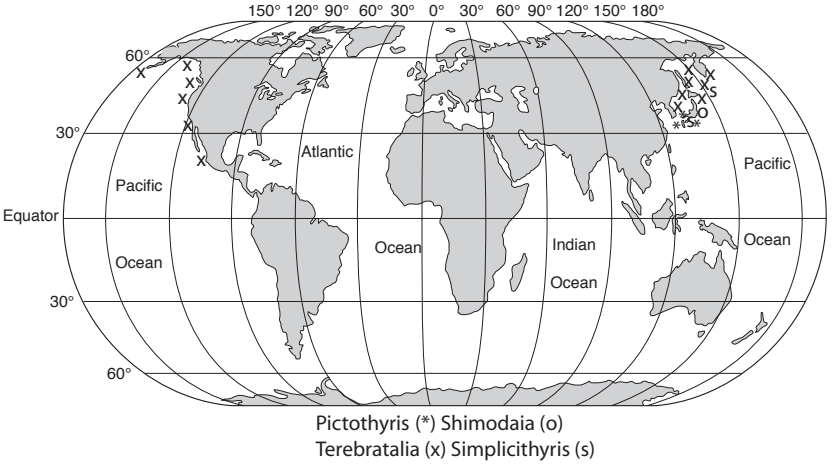

FIG. 1952. Geographic distribution of extant articulated brachiopod genera in superfamily Laqueoidea (new).

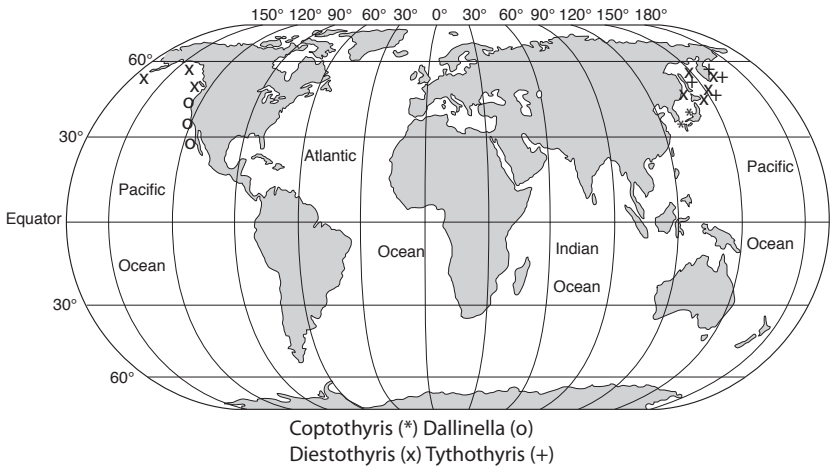

FIG. 1953. Geographic distribution of extant articulated brachiopod genera in superfamily Laqueoidea (new).

MEGATHYRIDOIDEA

The superfamily Megathyridoidea includes 25 extant species belonging to 3 genera (Table 55, Fig. 1954). All species occur in the neritic to upper bathyal zones. *Thaumatosia* is monotypical, with *T. anomala* recorded only from the neritic zone of the Andaman Sea. *Megathiris* comprises 2 species, with *M. capensis* being restricted to the neritic zone off the western coast of South Africa, while *M. detruncata* is a common and distinctive species in the Mediterranean and eastern North Atlantic (although a record from Guadeloupe in the Caribbean Sea should be questioned; DALL, 1920; COOPER, 1977). The diminutive genus *Argyrotheca* is one of the most common and diverse in the neritic and upper bathyal zones of all the oceans of the world, although most of the 22 named Caribbean species need to be restudied from larger collections to assess their range of variation. Many of these micromorphs take refuge on the undersides of coral colonies within coral reefs (LOGAN, 1975, 1977). The Caribbean, eastern North Atlantic, and Mediterranean are the areas where species of *Argyrotheca* are most prevalent, although they are also known from the Indo-Pacific region. One species, *A. jacksoni*, was described by COOPER (1973b) from shallow-water reef caves in the northern Red Sea and it has since been found in other parts of the Red Sea (LOGAN & others, 2007).

BOUCHARDIOIDEA

The superfamily Bouchardioidea includes 1 extant species belonging to the genus *Bouchardia* (Table 55, Fig. 1954). This species is *Bouchardia rosea,* which is present in high densities on the outer part of the shelf off the coast of Brazil. It is endemic to this region, where it occurs preferentially on carbonate substrates where shelf-break upwelling occurs (KOWALEWSKI & others, 2002).

PLATIDIOIDEA

The superfamily Platidioidea includes 16 extant species belonging to 5 genera (Table 56, Fig. 1955). The genus *Platidia,* which comprises 5 extant species, is widely distributed in all the major oceans, ranging in depth from the shallow neritic to the upper bathyal zones. *P. anomioides* and *P. davidsoni* are the most common species in the Atlantic and Mediterranean and difficult to tell apart. The 4 species of *Amphithyris* are all relatively shallow-water forms. Three are found around New Zealand and the fourth (*A. hallettensis*) is known from Antarctica. *Annuloplatidia*

TABLE 55. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamilies Megathyridoidea, Gwynioidea, and Bouchardioidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
MEGATHYRIDOIDEA			
Megathiris d'Orbigny, 1847	2	50–100	*M. capensis* Jackson, 1952: Atlantic Ocean: west coast of S. Africa (Saldanha Bay) (Jackson, 1952; Hiller, 1991, 1994)
		5–896	*M. detruncata* (Gmelin, 1790): Atlantic Ocean: British Isles; Portugal; Morocco; Canary Islands; Cape Verde; Madeira; seamounts off NW Africa; Mediterranean Sea; ?Caribbean Sea (Guadeloupe) (Davidson, 1887; Fischer & Oehlert, 1891; Dall, 1920; Atkins, 1960c; Cooper, 1977; Brunton & Curry, 1979; Logan, 1979, 1983, 1988a, 2003; Logan & others, 2002, 2004; Gaspard, 2003b; Alvarez & Emig, 2005)
Argyrotheca Dall, 1900	22	460–500	*A. angulata* Zezina, 1987: Indian Ocean: Glorieuse Is.; Moçambique Channel, 11°30'S, 47°20'E (Zezina, 1987)
		14–120+	*A. arguta* Grant, 1983: Pacific Ocean: Marshall Is: Eniwetak, Bikini atolls (Cooper, 1954b; Grant, 1983, 1987)
		36–550	*A. australis* (Blochmann, 1910): Pacific Ocean: S. Australia, Indian Ocean: Glorieuse Is.; Moçambique Channel, 11°30'S, 47°20'E (Blochmann, 1910; Zezina, 1987)
		34–1473	*A. barrettiana* (Davidson, 1866): Caribbean Sea: Gulf of Mexico; Jamaica; Florida; Bahamas; Honduras; Cuba; Panama; Barbados (Davidson, 1887; Dall, 1920; Cooper, 1954a, 1977; Asgaard & Stentoft, 1984)
		1–46	*A. bermudana* Dall, 1911: Atlantic Ocean: Bermuda, Caribbean Sea: Barbados; Grenada (Logan, 1975; Cooper, 1977; Asgaard & Stentoft, 1984)
		5–236 (?2324)	*A. cistellula* (Searles-Wood, 1841): Atlantic Ocean: British Isles; N. France; Channel Is.; Portugal; Canary Is.; Azores; seamounts off NW Africa; N. Spain; Norway; Mediterranean Sea; Adriatic Sea: Croatia (Fischer & Oehlert, 1891; Dall, 1920; Massy, 1925; Rioult, 1971; Logan, 1979, 2003; Brunton & Curry, 1979; Besteiro & Urgorri, 1984; Logan, MacKinnon, & Phorson, 1997; Simon & Willems, 1999; Di Geronimo & others, 2001; Gaspard, 2003b; Alvarez & Emig, 2005)
		3–600	*A. cordata* (Risso, 1826): Atlantic Ocean: British Isles; Canary Is.; Mediterranean Sea; Adriatic Sea: Croatia; Red Sea (Davidson, 1887; Dall, 1920; Atkins, 1960c; Logan, 1979, 1983, 1988a, 2003; Logan & Noble, 1983; Brunton, 1988; Simon & Willems, 1999; Alvarez & Emig, 2005; Logan & others, 2007)
		5–645	*A. cuneata* (Risso, 1826): Atlantic Ocean; British Isles; Madeira; Canary Is.; Cape Verde; seamounts off NW Africa; Mediterranean Sea; Adriatic Sea: Croatia (Davidson, 1887; Dall, 1920; Atkins, 1960c; Logan, 1979, 1983, 1988a, 2003; Brunton, 1988; Simon & Willems, 1999; Gaspard, 2003b; Alvarez & Emig, 2005)
		37–285	*A. crassa* Cooper, 1977: Caribbean Sea: Barbados, Grenada (Dall, 1920; Cooper, 1977; Asgaard & Stentoft, 1984)
		330–785	*A. grandicostata* Logan, 1983: Atlantic Ocean: Canary Is. (Logan, 1983, 1988a)
		95–120	*A. hewatti* Cooper, 1977: Caribbean Sea: Gulf of Mexico, off Texas; Guyana (Cooper, 1977; Logan, 1990)
		<10–90	*A. jacksoni* Cooper, 1973b: Red Sea (Jackson, Goreau, & Hartman, 1971; Cooper, 1973b; Logan & others, 2007)
		10–50	*A. johnsoni* Cooper, 1934: Caribbean Sea: Bahamas; Jamaica; Puerto Rico (Cooper, 1934, 1977; Jackson & others, 1971)
		37	*A. lowei* Hertlein & Grant, 1944: Pacific Ocean: Gulf of California (Hertlein & Grant, 1944)
		54–150	*A. lutea* (Dall, 1871): Caribbean Sea: Gulf of Mexico; Cuba; Barbados (Cooper, 1977; Logan, 1977)
		145	*A. mayi* Blochmann, 1914: Pacific Ocean: Australia, E. Tasmania (Blochmann, 1914)
		26–55	*A. rubrocostata* Cooper, 1977: Caribbean Sea: Panama; Honduras; Belize (Cooper, 1977)

TABLE 55. *Continued.*

		55–140	*A. rubrotincta* (Dall, 1871): Caribbean Sea: Florida; Guyana; Curaçao; Bonaire; Barbados (Dall, 1871; Cooper 1977; Asgaard & Stentoft, 1984; Logan, 1990)
		6–981	*A. schrammi* (Crosse & Fischer, 1866): Caribbean Sea: Yucatan; Guadeloupe; Barbados (Davidson, 1887; Dall, 1920; Cooper, 1954a, 1977; Logan, 1975, 1977; Asgaard & Stentoft, 1984)
		59–80	*A. somaliensis* Cooper, 1973b: Indian Ocean: NE Somalia (Cooper, 1973b)
		84–137	*A. thurmanni* Cooper, 1973d: Atlantic Ocean: Brazil (Cooper, 1973d)
		2–110	*A. woodwardiana* (Davidson, 1866): Caribbean Sea: Jamaica; Cayman Is. (Davidson, 1887; Cooper, 1977; Logan, 1977,1981)
Thaumatosia Cooper, 1973b	1	40–77	*T. anomala* Cooper, 1973b: Indian Ocean: Andaman Sea, off Thailand; Andaman Islands (Cooper, 1973b)
GWYNIOIDEA			
Gwynia King, 1859	2	3–800 (?4060)	*G. capsula* (Jeffreys, 1859): Atlantic Ocean: British Isles; Channel Is.; N. France; N. Spain; Azores; E. Atlantic seamounts; Mediterranean Sea; Adriatic Sea: Croatia; Caribbean Sea: Windward Is., Lesser Antilles (Fischer & Oehlert, 1891; Dall, 1920; Massy, 1925; Rioult, 1971; Zezina, 1975a; Brunton & Curry, 1979; Besteiro & Urgorri, 1984; Harper & others, 1996; Logan, MacKinnon, & Phorson, 1997; Simon & Willems, 1999; Gaspard, 2003b; Alvarez & Emig, 2005)
		1605–1865	*G. macrodentata* Lüter, 2007: Pacific Ocean: Moore Seamount, east of New Zealand (Lüter, 2007)
BOUCHARDIOIDEA			
Bouchardia Davidson, 1850	1	10–108 (?200)	*B. rosea* (Mawe, 1823): Atlantic Ocean: S. America: Brazil: Uruguay (Davidson, 1887; Dall, 1920; Tommasi, 1970; Manceñido & Griffin, 1988; Brunton, 1996; Kowalewski & others, 2002)

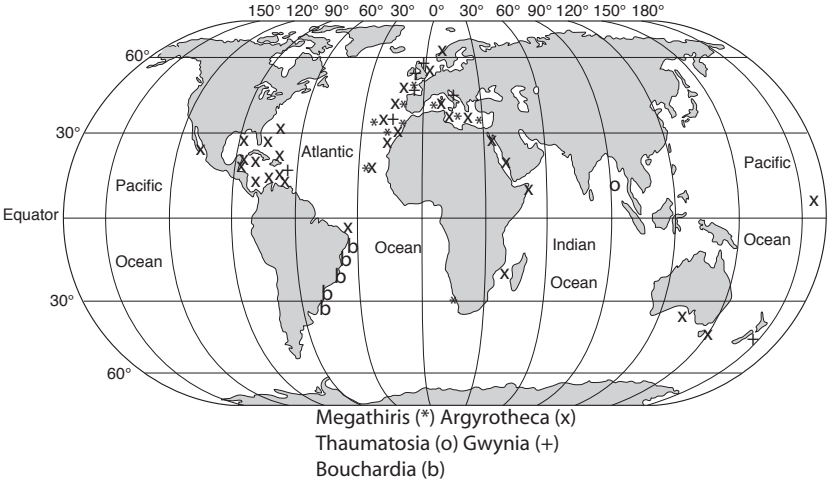

FIG. 1954. Geographic distribution of extant articulated brachiopod genera in superfamilies Megathyridoidea, Gwynioidea, and Bouchardioidea (new).

TABLE 56. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Platidioidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Platidia Costa, 1852	5	8–2190	*P. anomioides* (Scacchi & Philippi, 1844): Atlantic Ocean: Portugal; offshore seamounts; British Isles; Mediterranean Sea; Caribbean Sea: Barbados; Florida; Cuba; Grenada; Cayman Is.; Brazil; Pacific Ocean: Nazca and Juan de Fuca ridges; Red Sea; Antarctica (Jeffreys, 1878; Davidson, 1887; Fischer & Oehlert, 1891; Massy, 1925; Atkins, 1959a; Cooper, 1977, 1981b; Logan, 1979, 1981, 1983, 1998; Brunton & Curry, 1979; Asgaard & Stentoft, 1984; Zezina, 1987, 1990, 2000; Foster, 1974, 1989; Dawson, 1991; Hiller, 1991, 1994; Laurin, 1997; Kowalewski & others, 2002; Gaspard, 2003b; Logan & others, 2007)
		73–325	*P. clepsydra* Cooper, 1973a: Caribbean Sea: G. of Mexico; Florida; Barbados (Cooper, 1973a, 1977; Asgaard & Stentoft, 1984)
		595–1590	*P. concentrica* Zezina, 1980: Atlantic Ocean: Argentina; S. Shetland Is.; S. Orkney Is.; Pacific Ocean: Nazca and Juan de Fuca ridges (Zezina, 1985, 1990)
		82–897	*P. davidsoni* (Eudes-Deslongchamps, 1855): Atlantic Ocean: British Isles; NW Africa; Canary Is.; Mediterranean Sea; Caribbean Sea: Gulf of Mexico; Bahamas; Cuba; Argentina, Pacific Ocean: N. Caledonia (Davidson, 1887; Fischer & Oehlert, 1891; Atkins, 1959a; Cooper, 1973d, 1977; Logan, 1979; Brunton & Curry, 1979; Saiz Salinas, 1989; Laurin, 1997)
		105–1440	*P. marionensis* Cooper, 1981a: Indian Ocean: Marion Is.; Kerguelen Is. (Cooper, 1981a)
Amphithyris Thomson, 1918	4	91–1865	*A. buckmani* Thomson, 1918: Pacific Ocean: New Zealand, Cook Strait, South Island fiords; Chatham Rise; Fiji (Thomson, 1927; Bowen, 1968; Dawson, 1971, 1991; Richardson, 1981; Bitner, 2006b; Lüter, 2007)
		346–641	*A. hallettensis*, Foster, 1974: Antarctica: Ross Sea, off Cape Hallett; S. Orkney Is. (Foster, 1974)
		74–385	*A. richardsonae* Campbell & Fleming, 1981: Pacific Ocean: New Zealand, fiords of S. Island; Indian Ocean: S. Africa (west coast) (Campbell & Fleming, 1981; Hiller, 1994)
		366	*A. parva* MacKinnon& others, 2007. Pacific Ocean: Cook Strait, New Zealand (MacKinnon & others, 2007)
Annuloplatidia Zezina, 1981b	3	1298–2419	*A. annulata* (Atkins, 1959b): Atlantic Ocean: western entrance to English Channel, E. Pacific Ocean: Cocos Ridge (Atkins, 1959b; Brunton & Curry, 1979; Lüter, pers. comm., 2004)
		45–370	*A. horni* (Gabb, 1861): Pacific Ocean: British Columbia; Central California; Mexico (Bernard, 1972)
		370–5800	*A. indopacifica* Zezina, 1981b: Pacific Ocean: E. Indian Ocean: (Zezina, 1981b, 1985)
Leptothyrella Muir-Wood, 1965	3	335–5300	*L. incerta* (Davidson, 1880): Atlantic Ocean: Azores; Madeira; Canary Is.; Cape Verde; NW Africa; Atlantis Seamount; Caribbean Sea: St. Thomas (Davidson, 1880; 1887, Fischer & Oehlert, 1891; Zezina, 1981a, 2000; Logan, 1983, 1988a, 1998)
		225–3493	*L. galatheae* Zezina, 1981a: Atlantic Ocean: offshore seamounts, W. Pacific Ocean: Arafura Sea, New Guinea; Australia, Gt. Australian Bight, Tasmania; New Caledonia; New Zealand; Indian Ocean: Moçambique Channel; Antarctica: 120–180°, from south of N. Guinea to Antarctica (Zezina, 1981a, 1987; Foster, 1989; Laurin, 1997; Gaspard, 2003b)
		1987–2881	*L. ignota* (Muir-Wood, 1959): Indian Ocean: G. of Aden; Zanzibar; S. Africa (Muir-Wood, 1959; Zezina, 1981a; Hiller, 1986, 1994)
Neoaemula MacKinnon & others, 2007	1	20–30	*N. vector* MacKinnon & others, 2007: Fiordland, New Zealand (MacKinnon & others, 2007)

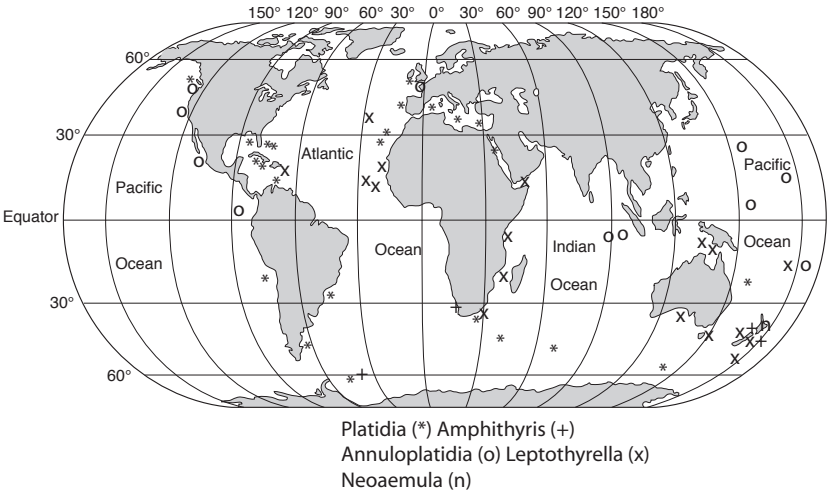

FIG. 1955. Geographic distribution of extant articulated brachiopod genera in superfamily Platidioidea (new).

is widely distributed, occurring in all three major oceans, and has 3 species, one of which (*A. indopacifica*) has a remarkable depth range of 370–5240 m in the west and central Pacific and descends to 5800 m in the region of the Kokosov Ridge west of Sumatra in the Indian Ocean (ZEZINA, 1981b, 1985). *Leptothyrella* (formerly *Phaneropora*) is also widely distributed geographically; of its 3 species, 2 are markedly eurybathic: *L. incerta*, a common North Atlantic form with a depth range of 335–5300 m, and *L. galatheae* from the Indo–West Pacific with a range of 225–3493 m. The third, *L. ignota*, occurs in the Red Sea–Gulf of Aden area, along with *Platidia anomioides* (MUIR-WOOD, 1959; LOGAN & others, 2007). A fifth genus, *Neoaemula*, with similarities to

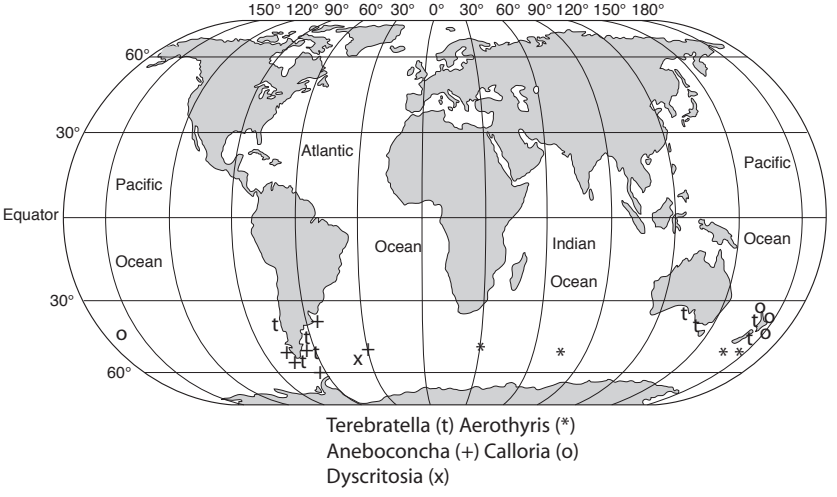

FIG. 1956. Geographic distribution of extant articulated brachiopod genera in superfamily Terebratelloidea (new).

TABLE 57. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Terebratelloidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Terebratella d'Orbigny, 1847	5	9–500	*T. dorsata* (Gmelin, 1790): Pacific–Atlantic Ocean: Chile; Strait of Magellan; Argentina; Falkland Is. (Davidson, 1880, 1887; Fischer & Oehlert, 1892; McCammon & Buchsbaum, 1968; Cooper, 1973d, 1982; Foster, 1974, 1989; Richardson, 1994)
		36–146	*T. haurakiensis* Allan, 1931: Pacific Ocean: N. Island, New Zealand (Bowen, 1968; Dawson, 1971, 1991; Foster, 1974, 1989; Richardson, 1994)
		36–180	*T. mayi* Blochmann, 1914: Pacific Ocean: Australia, Tasmania (Blochmann, 1914; Zezina, 1985)
		?	*T. rubicunda* Sowerby, 1846: Pacific Ocean: New Zealand (Davidson, 1887; Jackson, 1918; Brand & others, 2003)
		9–139 (236)	*T. sanguinea* (Leach, 1814): Pacific Ocean: S. Island, New Zealand (Foster, 1974, 1989; Richardson, 1981, 1994; Cooper & Lee, 1993; Ostrow & others, 2001)
Aerothyris Allan, 1939	2	6–930	*A. kerguelensis* (Davidson, 1878): Indian Ocean: Crozet Is.; Kerguelen Is. (Davidson, 1880, 1886 in 1886–1888; Dall, 1920; d'Hondt, 1977; Cooper, 1981a; Richardson, 1994)
		72–181	*A. macquariensis* (Thomson, 1918): Pacific Ocean: Macquarie and Antipodes Is., S. of New Zealand (Bowen, 1968; Foster, 1969, 1974; Dawson, 1971, 1991; Richardson, 1994)
Aneboconcha Cooper, 1973d	1	129–726	*A. obscura* Cooper, 1973d: Atlantic Ocean: southernmost S. America, Argentina; Tierro del Fuego; S. Shetland Is.; Burdwood Bank (Cooper, 1973d; Richardson, 1994)
Calloria Cooper & Lee, 1993	2	0–92 (184)	*C. inconspicua* (Sowerby, 1846): Pacific Ocean: New Zealand, Chatham Is. (Dall, 1920; Bowen, 1968; Foster, 1974; Doherty, 1979; Cooper & Lee, 1993; Richardson, 1981, 1994)
		10–30	*C. variegata* Cooper & Doherty, 1993: Pacific Ocean: N. Island, New Zealand (Cooper & Doherty, 1993; Richardson, 1994)
Dyscritosia Cooper, 1982	1	66–872	*D. secreta* (Cooper, 1982): Atlantic Ocean: east of Cape Horn, north of S. Georgia Is. (Cooper, 1982; Richardson, 1994)
Fosteria Zezina, 1980	1	311–1226	*F. spinosa* Zezina, 1980: Antarctica: Ross Sea, Weddell Sea (Foster, 1974; Zezina, 1980; Richardson, 1994)
Gyrothyris Thomson, 1918	1	79–563	*G. mawsoni* Thomson, 1918: Pacific Ocean: S. and E. of New Zealand, Antipodes Is., Macquarie Is. (Foster, 1974, 1989; Richardson, 1994; Lüter, 2007)
Neothyris Douvillé, 1879	6	36–236	*N. compressa* Neall, 1972: Pacific Ocean: New Zealand, Cook Strait (Richardson, 1981, 1994; Chapman & Richardson, 1981; Foster, 1989)
		203–274	*N. dawsoni* Neall, 1972: Pacific Ocean: New Zealand, Chatham Rise (Neall, 1972; Chapman & Richardson, 1981; Richardson, 1994)
		0–500	*N. lenticularis* (Deshayes, 1839): Pacific Ocean: New Zealand, S. Island; Chatham Rise; Lord Howe Rise (Dall, 1920; Rudwick, 1962b; Bowen, 1968; Neall, 1970, 1972; Dawson, 1971; Richardson, 1981, 1994; Zezina, 1980; Chapman & Richardson, 1981; Foster, 1989; Lüter, 2007)
		?	*N. ovalis* (Hutton, 1886): Pacific Ocean: New Zealand (Dawson, 1971, 1991)
		?	*N. parva* Cooper, 1982: Pacific Ocean: S. Island, New Zealand (Cooper, 1982)
		410–460	*N. westpacifica* Zezina, 2001b: Pacific Ocean: S. China Sea (Zezina, 2001b)
Syntomaria Cooper, 1982	1	181–486	*S. curiosa* Cooper, 1982: Atlantic Ocean: S. Sandwich Is. (Cooper, 1982; Richardson, 1994)
Anakinetica Richardson, 1987	1	31–222	*A. cumingii* (Davidson, 1852): Pacific Ocean: Australia, New South Wales, Bass Strait (Richardson, 1987; Brand & others, 2003)
Parakinetica Richardson, 1987	1	82	*P. stewarti* Richardson, 1987: Pacific Ocean: Australia, Bass Strait (Richardson, 1987)
Magellania Bayle, 1880	5	11–182	*M. flavescens* (Lamarck, 1819): Pacific Ocean: Australia, W. Australia: Queensland, Tasmania (Davidson, 1886; Blochmann, 1910; Dall, 1920; Foster, 1974; Richardson, 1994)
		75–1254	*M. fragilis* Smith, 1907: Antarctica: circumpolar (Jackson, 1918; Foster, 1974, 1989; Richardson, 1994)
		80–1894	*M. joubini* Blochmann, 1906: Antarctica: circumpolar (Blochmann, 1906; Jackson, 1918; Foster, 1974, 1989; Richardson, 1994)
		2–1362	*M. venosa* (Solander, 1789): Pacific–Atlantic Ocean: southernmost S. America: Chile–Uruguay, Strait of Magellan, Falklands Is. (Davidson, 1886 in 1886–1888; Fischer & Oehlert, 1892; Dall, 1920; McCammon, 1973; Cooper, 1973d; Foster, 1974, 1989; Richardson, 1994)
		284–494	*M. wyvillei* (Davidson, 1878): Pacific Ocean: Chile, southernmost S. America (Davidson, 1880, 1886 in 1886–1888; Hertlein & Grant, 1944; Foster, 1974)

TABLE 57. *Continued.*

Holobrachia Zezina, 2001b	1	410–460	*H. vietnamica* Zezina, 2001b: Pacific Ocean: S. China Sea (Zezina, 2001b)
Magadinella Thomson, 1915	1	67–281	*M. mineuri* Richardson, 1987: Pacific Ocean: Australia, Bass Strait (Richardson, 1987; Brand & others, 2003)
Pirothyris Thomson, 1927	1	29–363	*P. vercoi* (Blochmann, 1910): Pacific Ocean: S. Australia, Bass Strait (Blochmann, 1910; Dall, 1920; Richardson, 1987)
Dallina Beecher, 1893	8	123–567	*D. elongata* Hatai, 1940: Pacific Ocean: Japan, Kermadec Is. (Hatai, 1940; Foster, 1989; Dawson, 1991)
		339–1208	*D. eltanini* Foster, 1974: Pacific–Atlantic Ocean: Pacific-Antarctic Ridge and Drake Passage, southernmost S. America (Foster, 1974, 1989)
		64–724	*D. floridana* (Pourtalès, 1868): Caribbean Sea: Florida; Cuba; Puerto Rico; G. of Mexico (Dall, 1871; Davidson, 1886 in 1886–1888; Dall, 1920; Cooper, 1977)
		117	*D. obessa* Yabe & Hatai, 1934: Pacific Ocean: Sea of Japan (Hatai, 1936a, 1940)
		860–910	*D. parva* Cooper, 1981b: Atlantic Ocean: G. of Gascogne (Cooper, 1981b)
		81–563	*D. raphaelis* Dall, 1870: Pacific Ocean: Japan; New Zealand, Chatham Is. (Davidson, 1886 in 1886–1888; Dall, 1920; Hatai, 1936a, 1940; Lüter, 2007)
		37–2338	*D. septigera* (Lovén, 1846): Atlantic Ocean: North Sea; Barents Sea; Norway; Iceland; Faroes; British Isles; G. of Gascogne; N. Spain; Portugal; Canary Is.; offshore seamounts (Davidson, 1886 in 1886–1888: Fischer & Oehlert, 1891; Dall, 1920; Massy, 1925; Wesenberg-Lund, 1938, 1939, 1940a, 1941; Atkins, 1960b; d'Hondt, 1973, 1976; Brunton & Curry, 1979; Cooper, 1981b; Logan, 1983, 1988a, 1998; Anadón, 1994; Zezina, 1997b, 2000, 2001; Gaspard, 2003b; Logan & others, 2004)
		402	*D. triangularis* Yabe & Hatai, 1934: Pacific Ocean: Japan, Kyushu (Hatai, 1936a, 1940)
Nipponithyris Yabe & Hatai, 1934	2	690–1170	*N. afra* Cooper, 1973b; Indian Ocean: Moçambique; S. Africa; Pacific Ocean: Loyalty Is. (Cooper, 1973b; Hiller, 1994; Laurin, 1997)
		86–454	*N. nipponensis* (Yabe & Hatai, 1935): Pacific Ocean: Japan, Sea of Japan; Kyushu (Hatai, 1936a, 1940; Cooper, 1973b; Zezina 1985)
Campages Hedley, 1905	7	204–631	*C. asthenia* Dall, 1920: Pacific Ocean: Philippines; Borneo; Celebes Is.; Kei Is.; Japan (Dall, 1920; Jackson & Stiasny, 1937)
		23–1272	*C. basilanica* Dall, 1920: Pacific Ocean: Japan; Philippines; S. China Sea; Kei Is.; Celebes Is. (Dall, 1920; Hatai, 1936a, 1940; Jackson & Stiasny, 1937)
		110–123	*C. dubius* (Hatai, 1940): Pacific Ocean: Japan (Hatai, 1940)
		208–500	*C. furcifera* Hedley, 1905: Pacific Ocean: eastern coast of Australia; Loyalty Is.; Indian Ocean: S. of Bali (Dall, 1920; Zezina, 1981a; d'Hondt, 1987)
		38–108	*C. mariae* (Adams, 1860): Pacific Ocean: Japan; Kei Is. (Hatai, 1936a, 1940)
		91–102	*C. nipponensis* Yabe & Hatai, 1935: Pacific Ocean: Japan, Kyushu (Hatai, 1936a, 1940)
		208–402	*C. pacifica* Hatai, 1940: Pacific Ocean: Japan, Kyushu (Hatai, 1940)
Jaffaia Thomson, 1927	1	78–549	*J. jaffaensis* (Blochmann, 1910): Pacific Ocean: S. coast of Australia; Perth-Sydney (Blochmann, 1910; Zezina, 1981a, 1985; Richardson, 1994)

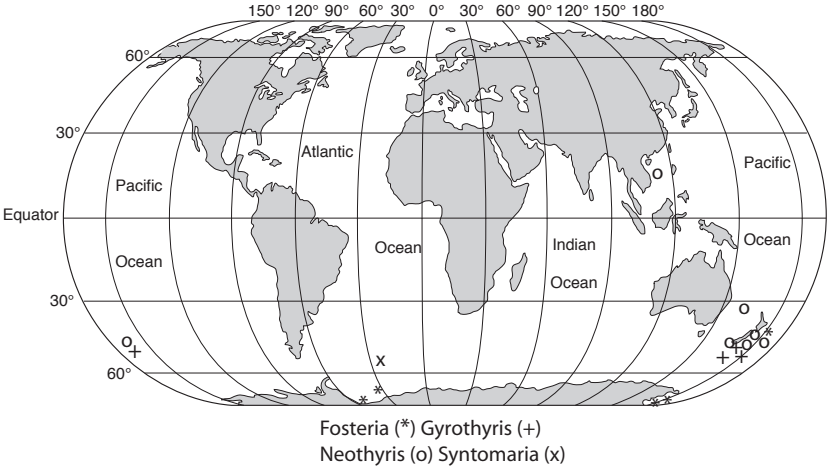

FIG. 1957. Geographic distribution of extant articulated brachiopod genera in superfamily Terebratelloidea (new).

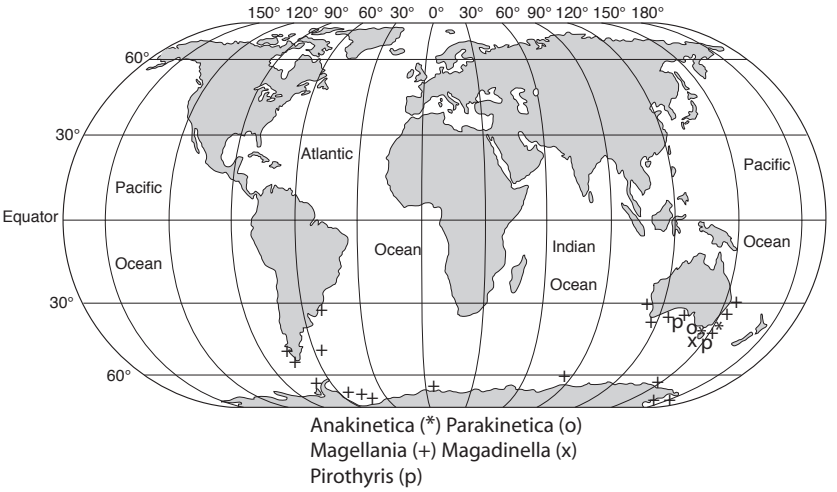

FIG. 1958. Geographic distribution of extant articulated brachiopod genera in superfamily Terebratelloidea (new).

the Cretaceous genus *Aemula,* has recently been described from New Zealand by MACKINNON and others (2007).

TEREBRATELLOIDEA

The superfamily Terebratelloidea includes 48 extant species belonging to 19 genera (Table 57, Fig. 1956–1959). The life habits and biogeography of one subfamily, the Terebratellinae, were discussed in detail by RICHARDSON (1997b), to which the reader is referred. All members of this subfamily were formerly restricted in distribution to the southern hemisphere, but the discovery of a new species of *Neothyris* in the South China Sea by ZEZINA (2001b) has expanded its range northward. Nevertheless, 15 genera in the superfamily have species that are found

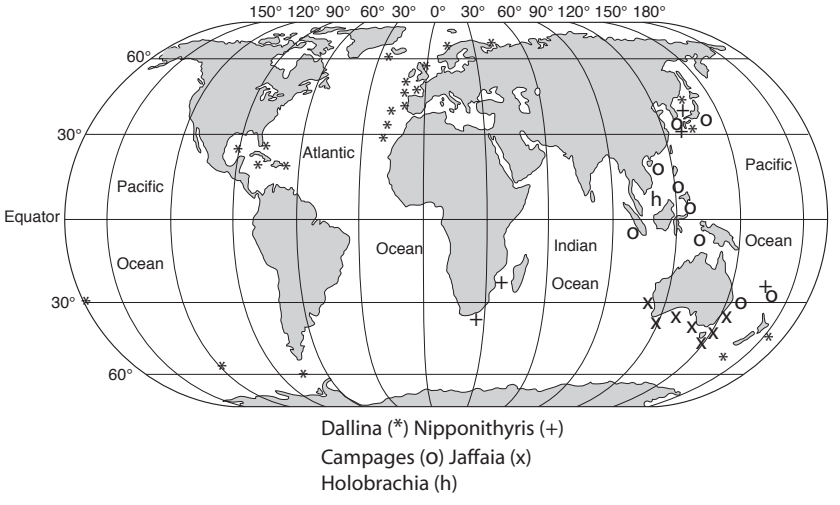

FIG. 1959. Geographic distribution of extant articulated brachiopod genera in superfamily Terebratelloidea (new).

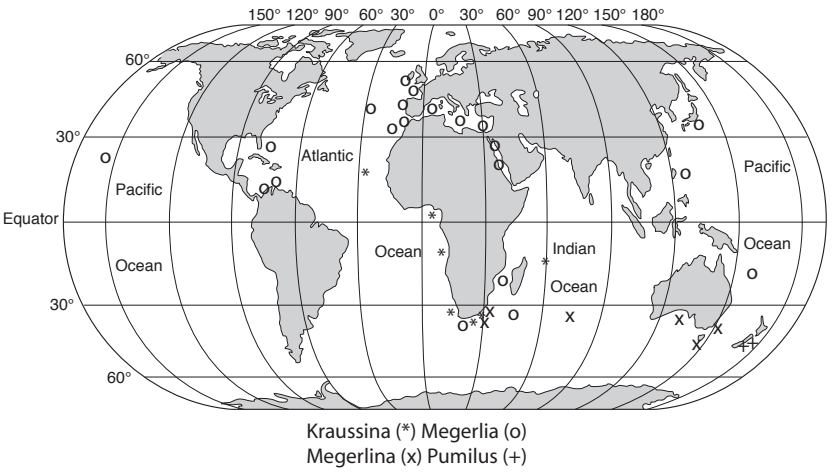

FIG. 1960. Geographic distribution of extant articulated brachiopod genera in superfamily Kraussinoidea (new).

almost entirely in latitudes higher than 30° S, either around Australia (*Terebratella, Jaffaia, Magellania, Magadinella, Pirothyris, Anakinetica, Parakinetica*), New Zealand (*Terebratella, Calloria, Aerothyris, Gyrothyris, Neothyris*), the southern Indian Ocean (*Aerothyris*), the South Atlantic (*Syntomaria, Aneboconcha, Dyscritosia, Magellania*), or Antarctica (*Fosteria, Magellania*).

The genera *Aneboconcha, Dyscritosia, Holobrachia, Magadinella, Pirothyris, Jaffaia, Fosteria, Gyrothyris, Syntomaria, Anakinetica*, and *Parakinetica* are all monotypical. Most terebratelloid genera (almost 90%) have species with a depth range exclusively in the neritic zone (*Calloria, Anakinetica, Parakinetica*) or from the neritic to upper bathyal zones. *Dallina*, with 8 extant species, is the most widely distributed, with most species being found on the shelf and upper slope—only the well-known North Atlantic species *Dallina septigera* descends to over 2000 m.

KRAUSSINOIDEA

The superfamily Kraussinoidea includes 17 extant species belonging to 4 genera (Table 58, Fig. 1960). All species are found at depths of less than 2000 m, with 13 of the 17 known species restricted to the neritic zone. *Pumilus* is monotypical, with *P. antiquatus* being restricted to intertidal areas around South Island, New Zealand. There are 7 species of *Megerlina*, all confined to localities in the southern hemisphere above 30° S (southern Australia, southern Indian Ocean), and all found in the neritic zone. *Kraussina* is found mainly in the southern Indian Ocean at relatively shallow depths, especially off the southern coast of South Africa, and is also present along the eastern South Atlantic as far north as Cape Verde. *Megerlia* is perhaps the best known kraussinoid genus, with *M. truncata* common in the neritic and upper bathyal zones in the Mediterranean Sea and eastern North Atlantic. The closely related *M. echinata* is also present in the eastern Atlantic but additionally has been recorded from the Caribbean Sea, Indian Ocean, and Pacific. Although normally a bathyal species (Table 58), it has been found with *Argyrotheca jacksoni* in shallow reef caves at 10 m depth in the northern Red Sea (COOPER, 1973b), probably another example of a bathyal island occurrence similar to those seen for *M. truncata* in shallow caves from France, Spain, and Croatia in the Mediterranean area (LOGAN, 2003).

GWYNIOIDEA

The superfamily Gwynioidea includes 2 extant species belonging to the single

TABLE 58. Depth range and geographic distribution of extant species of articulated brachiopods belonging to superfamily Kraussinoidea (new).

Genus	N	Depth or range (m)	Species, geographic distribution, and selected references
Kraussina Davidson, 1859	5	0–50	*K. cognata* (Sowerby, 1847): Atlantic-Indian Ocean: South Africa (Jackson, 1952; Hiller, 1991, 1994)
		42–82	*K. crassicostata* Jackson, 1952: Atlantic-Indian Ocean: South Africa (Jackson, 1952; Cooper, 1973d; Hiller, 1991, 1994)
		223–278	*K. gardineri* Dall, 1910: Indian Ocean: south of Saya de Malha Banks (Dall, 1910; Cooper, 1973b)
		9–930	*K. mercatori* Helmcke, 1939: Atlantic Ocean: Cape Verde; G. of Guinea (Anobon Is., Sao Tome Is.); Angola coast (Helmcke, 1939; Cooper, 1975; Logan, 1988a, 1993)
		40–165	*K. rubra* (Pallas, 1776): Atlantic-Indian Ocean: southern coast of Africa (Namibia to Moçambique) (Jackson, 1952; Cooper, 1973d; Hiller, 1986, 1991, 1994)
Megerlia King, 1850	4	50–290	*M. acrura* Hiller, 1986: Atlantic-Indian Ocean: South Africa; Moçambique (Hiller, 1986, 1991, 1994)
		10–1970	*M. echinata* (Fischer & Oehlert, 1890): Atlantic Ocean: NW Africa and seamounts; SW Ireland, SW England; Caribbean Sea: Florida; ?Barbados; Venezuela; Indian Ocean: coast of South Africa; Red Sea; Pacific Ocean: New Caledonia (Fischer & Oehlert, 1891; Massy, 1925; Atkins, 1961a, 1961b; Cooper, 1973b, 1977; Hiller, 1991; Laurin 1997; Gaspard, 2003b; Logan & others, 2007)
		185–600	*M. gigantea* (Deshayes, 1863) Indian Ocean: Moçambique Channel; S. of Madagascar (Walters Bank, Samper Bank) (Cooper, 1981a; d'Hondt, 1987; Zezina, 1987)
		8–1086	*M. truncata* (Linnaeus, 1767): Atlantic Ocean: Canary Is.; Madeira; Portugal; G. of Gascogne; Morocco; Mediterranean Sea; Adriatic Sea; Red Sea; ?Pacific Ocean: Philippines; Hawaiian Is.; Japan (Davidson, 1887; Atkins, 1961b; Brunton & Curry, 1979; Logan, 1979, 1983, 1988a, 2003, 2004; Cooper, 1981b; Brunton, 1988; Logan & others, 2007) (*M. truncata* includes citations of var. *monstruosa* by many authors)
Megerlina Eudes-Deslongchamps, 1884	7	18	*M. atkinsoni* (Tenison-Woods, 1878): Pacific Ocean: Australia, southern Tasmania (Davidson, 1887; Blochmann, 1910)
		50–420	*M. capensis* (Adams & Reeve, 1850): Atlantic-Indian Ocean: South Africa to Moçambique (Jackson, 1952; Hiller 1991, 1994)
		3–30	*M. davidsoni* (Vélain, 1877): Indian Ocean: St. Paul Is. (38°43'S, 77°32'E) (Davidson, 1887; Cooper, 1981a)
		36–200	*M. lamarckiana*: (Davidson, 1852): Pacific Ocean: Australia, N.S.W., S. Australia, Tasmania (Davidson, 1880, 1887; Blochmann, 1910; Dall, 1920)
		100–150	*M. natalensis* (Krauss, 1844): Atlantic-Indian Ocean: South Africa to Moçambique (Cooper, 1973d; Hiller 1991, 1994)
		0–272	*M. pisum* (Lamarck, 1819): Atlantic-Indian Ocean: South Africa to Moçambique; Moçambique Channel (Davidson, 1880, 1887; Jackson, 1952; Savage, 1972; Zezina, 1987; Hiller, 1986, 1991, 1994)
		32–450	*M. striata* Jackson, 1952: Atlantic–Indian Ocean: South Africa to Moçambique (Davidson, 1880, 1887; Jackson, 1952; Cooper, 1973d; Hiller, 1991, 1994)
Pumilus Atkins, 1958	1	intertidal	*P. antiquatus* Atkins, 1958: Pacific Ocean: New Zealand, S. Island (Atkins, 1958; Rudwick, 1962b; Bowen, 1968)

genus *Gwynia* (Table 55, Fig. 1954). The most common modern representative is the micromorphic species *Gwynia capsula,* from the eastern North Atlantic and the Adriatic Sea. LOGAN and others (1997) provided strong evidence in support of this form as a distinct species in its own right and listed collecting localities from the coasts of Britain, Ireland, France, and Spain. It is most commonly found in the neritic zone but may range down into the upper bathyal zone. There is a questionable record of a specimen dredged by *Talisman* in 1883 from 4060 m north of the Azores by FISCHER and OEHLERT (1891). Recently LÜTER (2007) has described a second species from the upper bathyal zone east of New Zealand. This specimen has similarities to the Jurassic form *Zellania* but is so far only represented by a single juvenile with a trocholophous lophophore.

CONCLUSIONS

In summary, the extant articulated brachiopods, although much less diverse than their fossil counterparts, are represented in the benthos of all the oceans of the world and in all depth zones. While most species occur in the neritic zone, many range down into the bathyal zone and a few into the abyssal zone. It is expected that further discoveries will be made in the future as exploration and sampling of the benthos of geographically remote areas and the deeper parts of the ocean continues.